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Human Factors at Cash Register Plant*

Evolution of Welfare Work at Dayton—Division of Profits with Resultant Low Labor Turnover—Apprenticeship in Cooperation with Engineering Schools

IN 1894 a large number of cash registers was returned to the factory of the National Cash Register Co. because of defective workmanship. Investigation showed this to be due to several causes. Workmen were trying to produce new models with the same tools which were used for making earlier models. The factory, as was commonly the case in those days, was unsanitary, poorly lighted, and the grounds were littered with scrap, rubbish and material. The grounds were surrounded by a high board fence. There was nothing in his work surroundings to inspire the workman to do his best. The first step toward improvement was the furnishing of better sanitary conditions. The next the removal of the board fence and then the planting of shrubbery and sowing of grass seed. Improvement was at once noted in work turned out. This work has gone along through the years, until today the plant is surrounded by lawns, trees and shrubs.

*Several articles on the National Cash Register Co. were contributed by L. S. Love last year, covering tooling and machining methods among other things, the issues being Aug. 30, Sept. 13, Oct. 25 and Dec. 20.

Employees to the Number of 1200 May Be Seated at Once in the Main Cafeteria

The next step was the embryo of the present extensive lunch room facilities. One day it was noticed that one of the women employees placed a pail of coffee on a radiator to warm. From this the idea was conceived of providing hot lunches, first for the women, later for all employees, at the cost of food. Today there are four lunchrooms. In the main office building are two, one for executives, foremen, etc., and one for women employees. Another lunch room, seating 1200, is provided for other employees, except those from the foundry, for whom a lunchroom is provided in the foundry building. This saves the necessity for their taking time to change their clothes to go to the main lunchroom. The same kitchen serves both these dining rooms.

The next step after improving conditions in and around the factory was to improve conditions in the neighborhood. The factory is located in what was then known as Slidertown, one of the worst sections of the city, the main problem being the boys who broke fences and stoned out windows. To keep these boys, and girls as well, profitably employed and out of mischief, the boy garden idea was started. The company provided space, tools and seeds, and the boys did the work. This idea has developed into a kind of settlement work, which includes clay modeling, wood carving and drawing for the boys and sewing, embroidery and cooking classes for the girls. Graduate boy gardeners join the Boys Box Furniture Co., which at first made simple furniture from old packing boxes, but now uses new lumber and makes cabinets, tabourets, bird houses, flower boxes, etc. This training not only keeps them out of mischief, but helps them to spend time in useful pursuits and occupations. They are able to make many repairs at home, because of this training.

The work with boys and girls developed into a competition for prizes in the neighborhood for the best kept lawns, backyards and gardens. Slidertown finally became South Park. The work started in Dayton by the National company has spread and can be extended still farther through distribution of instructive booklets, neighborhood improvement association, etc.

In further regard to improved sanitation, considerable development has taken place. A hygiene department has been instituted, consisting of a surgeon, two physicians, four nurses, two masseurs and two dentists. This department has reduced lost time from sickness to a remarkably low figure. Baths and showers have been installed and each employee is permitted one bath a week in winter and two in summer on the company's time.

Laborers, who are of an unusually high type, wear khaki or white uniforms in their work. These men are permitted use of the barber shop for hair cutting and shaves on company's time. They are required to bathe daily and have nails manicured, then proceed to the dining rooms for service as waiters. For this service they leave their work in the shop at 11.30, bathe, etc., wait on tables and are paid until 12.30.

Freedom from dust in the plant is maintained through proper suction appliances and fresh air ducts. General health is assisted by use of sanitary fountains, abolishment of roller towels, ten minute rest period during morning and afternoon for women workers and a shorter work day for women, permitting them to avoid congested street railroad cars. Women are provided daily with clean aprons and sleevelets without charge. These are washed in the company's laundry. On rainy days umbrellas are lent by the company to employees ard in addition rubbers to the women.

With the idea that the eye will grasp learning more quickly than the ear, an auditorium is provided in which 2300 employees can be

Evening Classes for Employees Are Held in the N. C. R. City Club, which Was the Old Patterson Residence. Community hall and the old barn club are two of the recreational centers provided by the company for employees

Lost Time from Sickness Has Been Materially Reduced by the Installation of a Hygiene Department which Has a Surgeon, Two Physicians, Two Dentists, Four Nurses and Two Masseurs

Employees Are Encouraged to Use Their Brains. A library is provided in the main office building for their use

In the Departments Employing Women Ten-Minute Rest Periods Are Permitted in the Morning and Afternoon. Attractive rest rooms are provided for their use at these periods

accommodated. In this theater each day at noon motion pictures are shown. These are of an educational nature, as well as comic or otherwise. Facilities are provided for taking motion pictures. A $40,000 pipe organ is installed in this theater.

In the main office building is a library for the use of employees. All are taught to improve themselves in every way and to use their brains. Suggestion contests are held with prizes amounting to $3,000 every six months. The improvement in mind takes us into the Owl Classes held in the NCR Hall and the Cooperative Industrial High School and the part time extension school plans.

To cover the first a short outline of what is taught will probably give a good idea of the value of this work. The old Patterson residence in Dayton was used as a girls' dormitory during the war, then devoted to the uses of the NCR City Club. Owl Classes held in this hall have no age limit. Employees are taught in different subjects, each class having 1½ hr. per week for 26 weeks. Class in salesmanship covers various styles and types of registers and their application to different businesses. Students are given actual practice in salesmanship, one taking the part of merchant, another the part of salesman. Other classes are held in agency office practice, public speaking, shop mathematics, drawing and blueprint reading, Spanish, time and motion study, and for women employees home economics, dressmaking, millinery, health and hygiene. Women's classes are held in one of the high school buildings under the auspices of the National Cash Register Co. A part of the hall's facilities are a reading room, a nursery for use of children of employees during entertainments at the clubhouse, and a kitchen. Entertainments are held in a large auditorium, in which on other nights basket ball is played. Dances are held regularly Saturday nights by the Women's Club.

Another part of the welfare work is the former National Cash Register Country Club, several years ago deeded to the city of Dayton and now known as Hills and Dales Park. In this park are facilities for baseball, golf, tennis, polo, wading pool and amusements for children, camping, etc., and a community club known as the Old Barn Club.

The plan of profit sharing developed by the National Cash Register Co. might properly come under the classification of part of the story of production. This is one point where production and welfare overlap. The theory is that first labor is entitled to a living wage, and endeavor is made to keep the wages paid employees at least equal to the high prevailing rate in that section of the country for similar work. Capital is also entitled to a proper return. To cover this 6 per cent on invested capital is deducted. What is left over is divided equally between employees and stockholders.

Employees are divided into five groups. Group A is composed of managing employees or executives in the most responsible positions. These men receive 12 per cent of the net profits. Group B is composed of foremen and other executives whose duties do not call for the responsibilities of those in Group A. This group receives 5 per cent of the profits. Group C is composed of job foremen and others in minor executive capacity. This class receives 8 per cent of the profits. Group D is composed of all other employees at Dayton plant who have been with the company for at least six months. These receive 25 per cent of the profits. Group E is composed of employees who are on a 30-day probation basis before being placed in Group D. Any member of any group is in line for promotion into the

next higher group, depending upon abilities demonstrated.

The 50 per cent on net profits assigned to the company is devoted toward improvements and expansion of the business. It is invested in land, buildings, machinery, inventions, or whatever the needed expansion may call for each year. The 50 per cent share of profits does not always meet the amount spent by the company for such enlargement of business. Profits are determined by an outside firm of accountants. No value is given to "investment on patents" or "good will."

Individual share of profits to each employee is figured on wages or salaries earned in each six months period, but are paid three times a year. Provision is made for contingencies such as illness or temporary absence under permission. In case of death of an employee, his share of profits up to the time of his death is paid to his dependents at the next distribution date. This system has many advantages to the employee and also many to the company. Profits are paid in cash in addition to high wages and salaries. Everyone is a partner in the business. The company takes all risk of loss, the employee none. The more the company earns the greater the profit to the employee. Each man has opportunity to make himself capable to enter the next higher class.

The benefits from the company's standpoint are manifold. Labor turnover is reduced, with closer cooperation and greater efficiency. A desire for promotion is stimulated, with consequently an increase in production, decrease in cost and reduction in wasted materials, time and labor. Profits for all are increased, helping employees toward better living conditions, better education and more self confidence. Each employee taking more pride and effort in his work has lost the short-sighted outlook on life of producing as little as possible and loafing as much as possible. Many other beneficial results are apparent in the community life generally.

In other words, a good wage with a bonus or profit sharing plan is infinitely better than the same yearly amount paid in higher weekly wages, which are squandered and leave discontent and lack of interest in the work; better for the company and makes a better citizen of the employee, both financially and in character.

A personnel department is operative. It is working for a square deal to the company and the employee, and all the employees know it. Consequently they have confidence in the decisions of the department. A representation committee of shop men has been discontinued, as the employees never used it, preferring to go direct to the personnel division and get decisive action. They may appeal to the executive office if they desire.

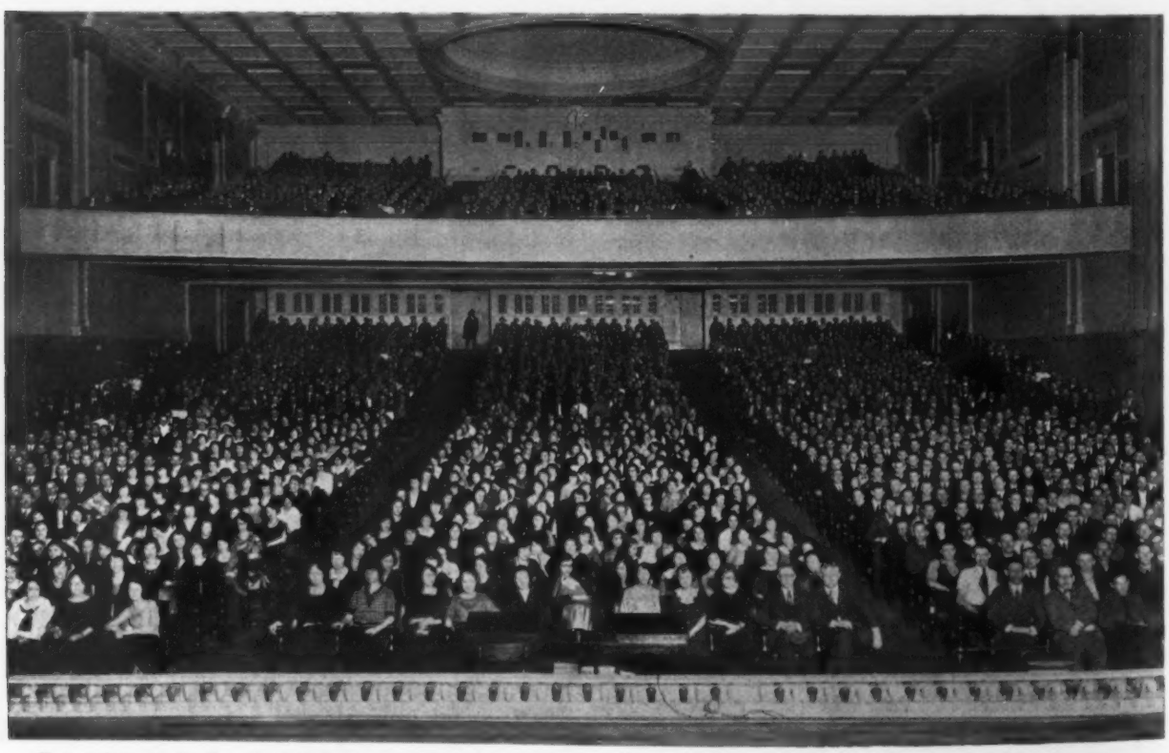
This personnel division was instituted during the war, as were similar divisions in many other plants. The department at the NCR is one of the comparatively few still active. It helps employees in shop relations, in many outside interests, often making recourse to lawyers unnecessary for the employees' private affairs. Company attorneys are permitted to assist employees in making income tax returns, etc.

Another phase of the work of this department is the rating of employees each six months as to ability, character, etc. In all the work the industrial relations department has shown itself as very important and having great bearing on the success of the company.

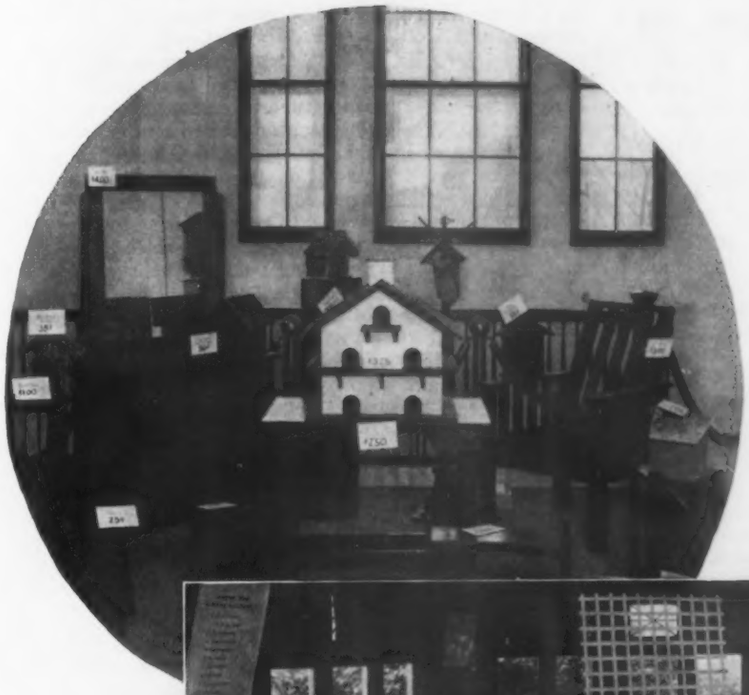
In common with many other shops, the National Cash Register Co. has had difficulty in securing trained employees. For this reason it has instituted an apprenticeship system in cooperation with schools and colleges. The object of this cooperative plan is to increase the knowledge, efficiency and earning capacity of future mechanics, as well as to make it possible for boys to secure an engineering course who otherwise would not be able to accomplish it.

It has been found that about 50 per cent of these apprentices stay with the company, thus materially improving the quality of the younger personnel. Some leave for employment elsewhere, which improves conditions in the trade generally. Some of those who leave later come back to the company with some added experience. The apprenticeship system is gaining steadily.

Cooperative apprentices are required to show two years of high school study accomplished, applications for the course being received during the second high school year. Boys are given employment during the vacation period following the second high school year. This is a further test of the boy's fitness and at its conclusion he is indentured as an apprentice. During these first two years at high school the school authorities shape the boy's course to fit him for the later cooperative course.



Entertainment Is Provided Each Lunch Period in a Theater Seating 2300. Pictures and organ recitals are the most frequent forms of entertainment



Neighborhood Boys Are Kept Out of Mischief and Instructively Helped by the Boys' Box Furniture Factory. Originally articles were made of old packing boxes, but latterly new lumber is used and an extensive variety of useful articles turned out by the boys

In the Dayton Cooperative Industrial High School boys taking the course range from 16 to 18 years of age. The school year consists of 26 weeks in the shop and 24 at school. Hours at school cover five days per week and seven hours per day. Boys alternate every two weeks between school and shop and are paired, so that each pair of boys alternating keeps the school balanced and also keeps the same number of apprentices in the shop each week. Foremen in the shop have definite instructions to follow, so that the shop work may supplement the school work and completely synchronize with it.

Each Saturday morning there is a meeting of boys. They run these meetings themselves under regular parliamentary procedure, thereby helping to fit themselves as citizens. They elect their own officers and in the meetings discuss features of their work, operations, etc., so that all may fully understand just what is going on. This is a time for any boy to bring up for discussion some phase of his work that is puzzling him. They are also given talks by department heads, etc.

The last Saturday of each month the meeting is devoted to a demonstration by one apprentice who takes any subject of an educational nature, a hobby, his job, etc. Recently a graduate of Heidelberg who is taking the continuation course, learning tool making, gave a talk on psychology. The whole course is under the direction of an advisory committee composed of one member representing the school authority, two representing the manufacturers and two skilled mechanics. There are fourteen Dayton factories cooperating with the schools.

After the boys have had two years at the cooperative high school they may elect to take four hours a week at the Dayton continuation school or they may elect to take the engineering course at University of Cincinnati or Antioch College. The former is for a period of five years, the latter for six years. Time at schools applies against apprenticeship time.

Rates of pay at the shop are at present minimum 25c. per hour, with increases of 2½c. every six months during the first two years. After the third year boys are paid what they are worth. Engineering students are paid a minimum of 30c. per hour with 2½c. increase every six months for the first two years, then 2½c. per year for the last three. This, of course, is not sufficient to pay college expenses, but is a big help. College students alternate every four weeks at Cincinnati, every five weeks at Antioch.

At present there are 110 apprentices in the N.C.R. shops. Twenty-eight are at college; 54 in continuation school; the remainder are cooperatives. The electives are toolmaking, drafting, machinist trade, printing, pattern making and assembling at Dayton, and electrical, mechanical and commercial engineering and business administration at Cincinnati and Antioch.

The details of the courses cannot be outlined here. They cover certain periods on different types of machines, bench work, etc. Each department has its quota of apprentices. Tool making, for instance, can accommodate 20 apprentices. Full high school credits are allowed boys who complete the two years at the cooperative school. A degree in engineering is conferred on the student completing the course at college.

USE OF OXYGEN-ENRICHED AIR*

Experience in a Belgian Blast Furnace—Application to Ferrosilicon—Advantages in Roasting Non-Ferrous Ores

THE first serious attempt to use enriched air in metallurgical work was that made by the Belgians at Liége in their small iron blast furnace. This furnace had a considerabe history behind it and its characteristics and constants as operated in the ordinary manner were well known. A small liquid-air plant was set up near the furnace and the effect of introducing small quantities of oxygen in the blast was very carefully studied.

Oxygen in a Belgian Iron Furnace

While the detailed results of these experiments were not made available to the general public, and the outbreak of the war put an end to the experiments, nevertheless a certain amount of information is at hand. The slightest introduction of oxygen into the air blast made itself felt, a fraction of 1 per cent overcoming detrimental effect of the moisture of the atmosphere. An increase of oxygen content from the normal 20 per cent up to approximately 24 or 25 per cent made it possible to dispense with the hot-blast stoves and produced a higher grade iron. I do not recall whether they ever worked with a higher oxygen content than 25 or 26 per cent.

This development proceeded along rational lines. It must be remembered that the temperatures in the modern blast furnace are very close to the critical temperatures at which that type of apparatus can efficiently function. While it is true that a higher oxygen mixture would have made more smelting heat available in the furnace, we must seriously question whether the furnace could have withstood the accompanying temperatures, or whether the auxiliary equipment could have held them in check through more rapid charging, greater rapidity of descent of charge, or have handled the increased output.

An experience many years ago in changing the character of the charge in an iron blast furnace and suddenly doubling its smelting rate without giving due thought to charging equipment and to ability to handle the doubled output, impressed upon me the necessity of a most careful and comprehensive study of auxiliary equipment when attempting metallurgical revolutions. It is a situation that can only safely be approached step by step and great credit must be given the Belgians for the care with which they attacked this problem of enriched air in their small iron blast furnace.

Oxygen and Ferrosilicon

The second comprehensive experiment in the use of oxygen in large-scale metallurgy took place some years ago just over the boundary line, in Canada. It was an attempt made by a well known iron metallurgist of this country to produce ferrosilicon of high silicon content in a shaft furnace. A small coke-fired shaft furnace was built, based on the designs of this metallurgist, and enriched air carrying 60 per cent of oxygen was available in unlimited quantities. The experiment, while hardly to be classed as a complete failure, nevertheless actually advanced the art very slightly. The furnace possessed no history and had no standards behind it for comparison; and instead of approaching the problem from present practice, it was approached from the mathematical standpoint, the mathematics being based on pure theory without respect to the various factors such as tuyères, furnace lining, gas velocities, etc., entering into the calculation at any place.

Naturally, such an approach in this particular case, where shaft reduction plays little part, leads one to the answer that the greater the purity of the oxygen the better the furnace should work. As a matter of fact, it can hardly be said to have worked at all. The temperatures were so great that not only did the furnace melt down as rapidly, or even more rapidly, than the charge, but the back flash of the flame against the best water-cooled copper tuyères cut them out in a few minutes. The experimenter was so impressed with the accuracy of his mathematical calculations that he refused to pay due attention to the practical limitations of his actual furnace.

From the two experiments cited, which are the only ones conducted on a large scale with which I am familiar, I can but repeat that I do not believe the use of oxygen is going to suddenly revolutionize metallurgical practice. We are going to take standardized apparatus, well known as to peculiarities and of which we are completely informed as to constants, and slowly and carefully and step by step, through the introduction of oxygen build up a set of experimental data, revising our equipment as to details on the basis of our new knowledge and, without appreciable break from sequence, develop from our present to the new practice. All the calculations in the world will not prevent a fire brick from melting or a tuyère from being cut out if we have not also the acquired experience of slow and tedious experimentation.

Fields for Development

There are a number of metallurgical fields quite or almost untouched; the iron blast furnace is one of them. Whether oxygen at $15 or $20 per ton can replace the hot-blast stoves, the dry-air equipment and other apparatus, economically, must be left to the furnace engineer. It is a very complicated problem. The Bessemer converter offers some slight encouragement. It is not impossible to contemplate the use of a still lower grade metal together with enriched air. I use the term "lower grade" in this case to mean a lesser percentage of fuel elements. The basic converter seems to me to offer a better field for work than the acid converter. The open-hearth furnace and the crucible furnace present little field for effective use of enriched air; the wear and tear on equipment will become too great with enriched air for its use to be profitable.

I have always felt that the copper industry presents some interesting problems which the use of oxygen should solve. Pyritic smelting is essentially an oxidizing action. With true pyritic smelting, the higher the temperature, or in other words the greater the available smelting heat, the better the furnace should operate. If one desires to convert a copper converter into a combined converting and smelting operation, the use of enriched air may find some field. I must leave to the copper metallurgist the question of whether a shaft furnace or a copper converter is the best type of smelter. I have never been enthusiastic about the introduction of oxygen in lead smelting.

In the Roasting of Ores

There is, however, one important possibility in the metallurgy of the non-ferrous metals that must not be overlooked, and that is in the preliminary roasting operations. I believe that the judicious use of enriched air in roasting will greatly simplify the operation. It will suddenly lower the grade of self-roasting ores, thereby eliminating the use of external fuel, and should at the same time yield a more completely dead-roasted product. This is a field of great breadth in that it affects practically the whole of the non-ferrous industry and possesses many very valuable features, which are fundamental to the practice though far from available to the present metallurgist. It is a point of attack which should yield the greatest results with the least expenditure of effort and money.

Of secondary interest to the roasting operation is the fact that the use of enriched air greatly simplifies the recovery of the roaster gases. The conversion of these gases into sulphuric acid is now almost a standardized procedure. This conversion would be very greatly affected through the use of enriched air and the elimination of external fuel and is quite as important a factor in our whole metallurgical procedure as the roasting operation itself.

*From a contribution to the symposium on "Oxygenated Air in Metallurgy," conducted by the American Institute of Mining and Metallurgical Engineers at its annual winter meeting in New York, Feb. 20. The author, W. S. Landis is vice-president American Cyanamid Co., New York.

Heat Treating Low-Carbon Bars for Rivets

Cold Working Strains, as Cause of Broken Heads, Removed—Properties of Final Product Improved

BY C. B. LANGSTROTH*

MOST metallurgists, belonging to the younger branch of the profession whom we recognize as physical metallurgists, are quite well aware of the benefits to be derived from heat treating low-carbon steel. The designing engineer and the general user are, however, not so well acquainted with these advantages. The practical application of the advantage derived from heat treating low-carbon steel is very clearly shown by some experience with rivets.

The company where the particular study of rivets was made used 4000 to 6000 lb. of rivets daily. It found that the heads of some rivets broke off after the cold riveted parts had been shipped. This failure was not only very expensive, but it also caused considerable adverse comment in regard to the company's product.

Standard specifications for rivets call for the following analysis:

	Per Cent
Carbon	0.08—0.12
Manganese	0.30—0.50
Phosphorus	0.04 or under
Sulphur	0.045 or under

On over 100 tests of broken rivets there were none that did not comply with the above analysis, so that from this standpoint the rivets were satisfactory.

It was impossible of course to make any physical tests on the broken rivets aside from the hardness and this was found to be no different on the broken rivets than on the unbroken ones.

The next investigation took up the microstructure of the rivets and on all of the broken heads evidence was found of cold-working strains in the corner where the head joins the shank of the rivet, and a further investigation of new rivets brought out the fact that a number of the new rivets were coming in with a small crack started in the region of the cold working strains.

Photomicrograph, Fig. 1, is a good example of this rupture. With the start as shown, it was not long before the fissure worked completely across the shank of the rivet with the ensuing failure.

To prevent the rupture starting in the rivet we assured ourselves that the bars were given a thorough anneal before being formed into rivets and, to further prevent any cold working strains remaining in the rivets, they were annealed after forming with the resulting structure shown in Fig. 2. The formation of

Fig. 1

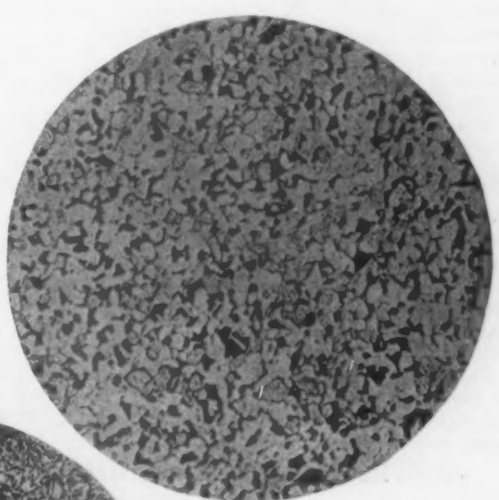


Fig. 2

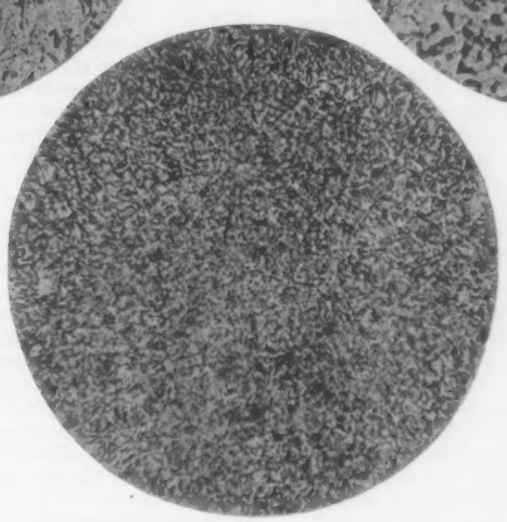


Fig. 3

Fig. 1 — Photomicrograph of the Condition of the Steel in the Rivet at the Point of Rupture

Fig. 2 — Photomicrograph of the Structure of the Rivets After Annealing

Fig. 3 — Photomicrograph of the Structure of the Rivets after Quenching, After Heating and Drawing Back

*Consulting engineer, 529 Stowell Avenue, Milwaukee.

any cracks in the head was prevented by this operation, but by using the rivet in a dead soft condition it was found that the rivets were too weak and also not in the best condition to resist the dynamic load they were subjected to. All of the cold working strains which are so prominent in Fig. 1 had been completely removed, but the rivet was naturally in its weakest condition due to the open grain.

In order that the rivets might have greater strength they were quenched after heading and then drawn back to prevent any high carbon rivets, which might come along and which would be too hard, from getting into the shop. Photomicrograph, Fig. No. 3, is a typical example of these heat-treated rivets. This reveals a tough sorbitic structure with all the cold working strains removed. These rivets proved to be satisfactory.

It is interesting to see the effect produced on the physical strength of the rivets by the annealing and heat treating mentioned above; physical tests showed:

	Natural	Annealed	Heat-Treated
Elastic limit, lb. per sq. in.....	48,000	33,000	41,800
Maximum tensile, lb. per sq. in..	73,000	48,300	60,100
Elongation, per cent in 2 in.....	11	42	40
Reduction of area, per cent.....	59	73	70

The standard practice now in heat treating the material for rivets is to anneal the rods before heading. The rivets are then heated to 1650 to 1675 deg. Fahr. and oil quenched, after which they are drawn back to 1250 to 1275 deg. Fahr.

From this treatment there is obtained, as the physical tests show, a rivet which is not as strong as the ones made from the unannealed stock but which is stronger than the ones after annealing. Also the cold working strains which were so prevalent in the rivets made from the stronger unannealed rods have been overcome. Thus by properly selecting the heat treatment we have eliminated the rivet troubles experienced by this manufacturer.

ANTI-FRICTION BEARINGS

Application to Material Handling Equipment Rapid—Use on Steel Mill Motors Has Advanced

Advanced practice in anti-friction bearings was outlined in a paper by P. B. Liebermann, industrial engineer, Hyatt Roller Bearing Co., Harrison, N. J., at a meeting of the Metropolitan section of the American Society of Mechanical Engineers, held in Newark, N. J., March 11.

The advantages of any anti-friction bearing as compared to a well designed plain bearing were discussed and regarding ball and roller bearings it was said that for most applications they were equally suitable. When heavy loads must be carried in a limited space, the greater capacity of roller bearings, size for size, was said to make them preferable, this also holding true where severe conditions of shock and vibration exist. Where loads are light, operating conditions smooth and speeds of several thousand r.p.m. are encountered, ball bearings were thought to be generally given preference.

To illustrate the various characteristics of anti-friction bearings typical applications were discussed, and illustrated with lantern slides. These examples were limited to one type of roller bearing.

Use On Material Handling Equipment Rapid

The application of anti-friction bearings to material handling equipment was cited as having been particularly rapid. Among these, belt conveyor installations were discussed, a conveyor with its multitude of bearings being said to be improved in several ways by the application of anti-friction bearings. The advantages as arrived at by tests are given in what follows:

"The number of conveyor installations in operation has made it possible to conduct extensive and conclusive tests which have brought out valuable information on power consumption of both plain bearing and anti-friction bearing equipment. These results were obtained by measuring the power input into the driving motor, also the belt speed and weight of material carried by the belt per hour. After reducing the test data to a common basis for purposes of comparison, it was shown that a saving in power of from 40 to 50 per cent is obtainable under average service conditions by the use of Hyatt roller bearings.

"With a belt conveyor such a saving does not merely mean so many hp. or kw. hours, it means also less tension on the belt, less number of plies, a smaller motor and controlling apparatus, and naturally, less wear and tear. The latter is particularly due to the reduced starting effort."

Details were given on two conveyor installations which were cited as represening the most advanced practice in this field. One was the Colonial conveyor system of the H. C. Frick Coke Co. which carries coal a distance of five miles underground through a tunnel from the mine to a tipple on the Monongahela River. The coal was formerly carried by mine cars and locomotives. The conveying method is superior to the mine car method in offering continuous and uninterrupted service and much greater output over the existing haulage way in the mine.

The principal characteristics of this installation were given as follows: Total length of conveyor five miles, all below ground except at tipple. Number of individual conveyors, 20. Motive power: Each conveyor is driven by a three-phase 2200 volt, 875 r.p.m. induction motor of 175 hp. Reduction gears: Ratio, 875 to 39 r.p.m., stepping speed down to 39 r.p.m. Width of rubber belt, 48 in., 10 ply; belt speed, 550 ft. per min. Idlers: Some 3 pulley, some 5 pulley; idler spacing, 3 ft. Weight of coal carried, 1220 tons per hr. or 10,000 tons per 8 hr. day.

Anti-Friction Bearings Applied to Steel Mill Motors

The application of anti-friction bearings to electric motors was also discussed, it being pointed out that bearings are now applied to general purpose motors, locomotive motors, railway motors and vehicle motors.

"It is rather surprising," said Mr. Liebermann," that the biggest demand originated with the steel mills, where conditions are generally considered most severe and unfavorable. Bearings applied to steel mill motors have as a rule given a good account of themselves and their application has advanced so far that the need for standardization of bearing sizes, shaft dimensions and housing bore dimensions soon became apparent. Considerable progress has been made by the Association of Iron and Steel Electrical Engineers in conjunction with the Electric Power Club and it is expected that their investigation will be finished soon. It has been recommended by the bearings committee of the power club that only anti-friction bearings of the 300 series be used on general purpose motors of 1 to 100 hp.

"The motor application represents one of the few instances in which power saving is of a negligible amount. The losses caused by bearing friction in a well designed plain bearing motor rarely exceed 1 per cent. Anti-friction bearings may reduce this loss to ⅛ or ¼ per cent. This makes the fact stand out clearly that in many cases other advantages than power saving are sufficient to justify the use of ball or roller bearings. In the case of electric motors, the reduced leakage of lubricant from the bearings onto the insulation, together with less frequent lubricating periods and greatly reduced maintenance charges, make anti-friction bearings a paying investment.

"Quite frequently it happens that the bearing problem is nothing else but a question of economics, that is, lower first cost. This holds particularly true for such applications where well designed plain bearings are giving a fairly good account of themselves and where there seems to be on the face of it no apparent reason for a change to anti-friction bearings. When computing, however, all of the items entering into the cost of construction, that is, all material and labor, it sometimes leads to the surprising result that an anti-friction bearing can be applied at an initial saving in cost. Such a case happened some time ago to a large steel mill. on a new roller table."

High Rail Failure Record for 1917 Rollings

Better Records Later Justify Hope of Progressive Improvement, Says Rail Committee of Association—Electric Welding in Steel Fabrication Discussed

THE year 1917 stands out as a period of poor performance in comparative records of rail failures made public by the rail committee of the American Railway Engineering Association at its twenty-fifth annual convention at Chicago, March 11 to 13, inclusive. For five years of service just completed, standard section rails rolled in 1917 showed an average of 137.1 failures per 100 track miles on railroads reporting to the association, as compared with a five year average of 105.4 failures for 1916 rollings, 82.4 failures for 1915 rollings, and the low record of 74 failures for 1914 rollings. Records thus far compiled for later rollings indicate that 1917 registers a peak of bad performance and justify the hope that the banner record of the 1914 rollings will be at least equaled within the next few years.

Average Rail Failures per 100 Track Miles

Year Rolled	Years Service					
	0	1	2	3	4	5
1908...						398.1
1909...					224.1	277.8
1910...				124.0	152.7	198.5
1911...			77.0	104.4	133.3	176.3
1912...		28.9	32.1	49.3	78.9	107.1
1913...	2.0	12.5	25.8	44.8	69.5	91.9
1914...	1.2	8.2	19.8	32.9	50.9	74.0
1915...	0.7	8.9	19.0	34.2	53.0	82.4
1916...	1.6	11.8	29.2	47.7	70.6	105.4
1917...	5.3	21.6	38.9	66.0	110.5	137.1
1918...	1.6	8.9	27.6	54.0	92.8	
1919...	2.0	14.8	39.4	73.7		
1920...	3.9	14.2	32.4			
1921...	1.6	10.8				
1922...	1.5					

The committee also indicated that it hopes to succeed in devising a method by which the tonnage carried by the failed rail may be introduced into the calculations.

Transverse Fissures Due to Manufacturing Defects?

The committee announced that it is participating in a joint investigation of the underlying cause of transverse fissures in rails, cooperating with the Bureau of Standards of the Department of Commerce, the Rail Manufacturers' Committee, and the Joint Committee on Stresses in Track of the American Railway Engineering Association and the American Society of Civil Engineers. In a circular sent to members of the American Railway Association, asking for full information as to the number of rails which have failed from transverse fissure in track, it was stated that preliminary conclusions drawn from incomplete data previously furnished strongly indicate a defective manufacturing condition in the rail head as responsible for such failures, and do not bear out the assertions of the Bureau of Safety of the Interstate Commerce Commission, which has repeatedly insisted that excessive axle loads are the cause of transverse fissure development.

Slow progress was reported by the committee on its study of the comparative wear of various weights of rail.

The committee was not prepared to recommend a definite rail length in excess of the present 33-ft. standard for adoption as an alternative standard, and asked for a reassignment of the subject. It was pointed out that proponents of a 39-ft. rail length base their choice almost entirely upon the length of equipment available for transportation, while those advocating a 45-ft. length believe that equipment should not be a governing factor and that economies in track maintenance require that rail shall be the maximum permissible length consistent with proper expansion.

Average Weight of Rails Increases

A table compiled by the committee, showing the average weights of standard section rails rolled by the mills during the past six years, indicates a progressive increase, the average weight for all mills in 1922 being 101.3 lb., as against 97.7 lb. in 1921 and a low average of 94.2 lb. in 1919.

Average Weights of Standard Section Rails

Mill	1917	1918	1919	1920	1921	1922
Algoma	85.0	....	100.5	97.5	100.3	105.0
Bethlehem	102.1	109.2	113.3	101.1	115.3	122.1
Cambria	118.9	120.6	105.4	121.2	119.1	130.0
Carnegie	101.8	103.4	102.6	105.4	107.1	109.9
Colorado	89.8	89.2	89.2	90.3	90.0	89.4
Dominion	....	85.0	85.0	....	100.0	....
Illinois	94.6	93.2	92.3	95.5	95.8	96.3
Inland	....	....	....	....	....	95.2
Lackawanna ...	97.0	99.9	95.4	96.8	99.7	98.4
Maryland	106.5	102.6	91.6	85.0	85.0	....
Pennsylvania ...	....	100.0	101.1	119.3	105.5	119.2
Tennessee	87.5	87.9	89.0	88.7	88.2	90.0
Average	96.2	95.4	94.2	96.6	97.7	101.3

No Economy in Rerolling Rails

Barring exceptional circumstances on some roads, there is no economy in rerolling rails at the present high cost of doing this work, together with transportation costs necessary to move the rail to the mill and its return to points where it will be placed in the track. This was the conclusion reached by the Committee on Track as a result of compiling replies to a questionnaire sent to all Class 1 roads in the United States, exclusive of switching and terminal companies. The resawing of rails for relayers, however, was found to be economical and good practice either with a portable rail saw or at a permanent mill.

In its study of rerolling or resawing rail for relaying the committee arrived at the conclusion that the relative economies, as between resawing and reconditioning rail by building up the joints in the track by acetylene, electric or other processes, is so interwoven that a study of the economies as between the two methods can best be made by assigning both subjects to the Committee on Track.

Electric Welding in Steel Fabrication

Experience in electric welding of connections in steel structures was outlined by the Committee on Iron and Steel Structures, but insufficient progress has been made, in its opinion, to warrant action by the association at this time. Two methods of electric welding have been used—resistance welding and arc welding. In resistance welding the parts to be united are placed in contact, a current passed through the parts, heating them at the contact surfaces, and the pieces are then pressed together. The heat and pressure cause the parts in contact to be welded over a certain area.

Several types of machines have been designed for welding of this kind, one type being somewhat similar to the ordinary power machine used in driving rivets. The machine grips the parts to be welded between electrodes which force the parts together under pressure. The current is then turned on and the material brought to a welding heat, which, together with the pressure, makes a spot weld, uniting the adjacent parts of the material in the form of a small cylinder integral with the material of the connected parts. This is the method of spot welding. It has not been much used for steel structures.

The method most used thus far has been arc welding, according to which an electric circuit is formed between the carbon or graphite electrode and the two pieces of steel which are to be welded by bringing them together. The arc is then formed by withdrawing the electrode a short distance from the steel. This method is simplified by using the welding wire or rod as one electrode in place of a carbon or graphite electrode. In this case, the welding wire or rod melts and is fused with the molten steel of the parts to be welded.

Good results have been obtained in arc welding of structural steel for various kinds of structures. Pres-

sure tanks are very largely being constructed by arc welding instead of by riveting. One ship has been constructed by the use of arc welding throughout and has been in service for at least three years. The results obtained by arc welding are very largely dependent upon the skill of the welder, and this work should be performed only by skilled operators.

The art, however, has progressed sufficiently for us to know what conditions are necessary to obtain satisfactory results, and when these conditions prevail and the work is done by a good welder, satisfactory welds should be obtained. Unfortunately, the strength of the weld cannot at the present time be positively determined by an inspector. The strength of the joint is dependent in part upon the strength of the welding material. Tests indicate that this welding material has an average ultimate strength in shear of about 36,000 lb. per sq. in. A safe working stress would therefore be about 9000 lb.

Employee Representation Recommended

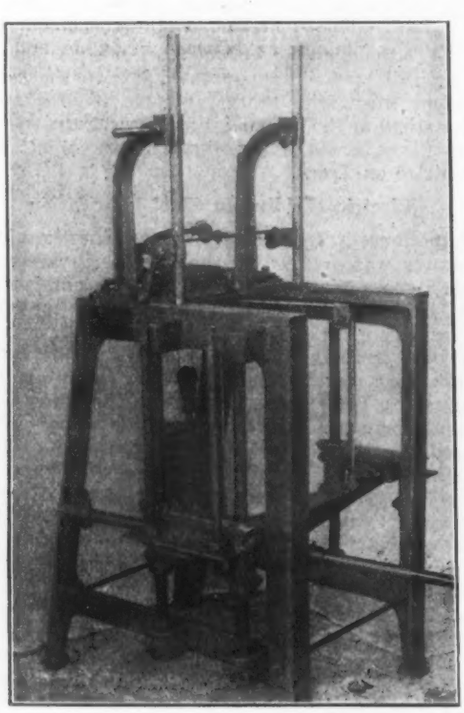
The adoption of a plan of employee representation in railroad work was recommended in the report of the Committee on the Economics of Railway Labor. Such a plan, in its opinion, will, through the improvement of the spirit of cooperation, serve largely to stabilize labor and reduce the problem of obtaining new employees. The committee also indicated its approval of benefit associations providing insurance against the hazards of sickness, accident, superannuation and death, and savings funds and loan provisions placed at the disposal of all worthy employees. Participation in stock ownership and the maintenance of satisfactory working conditions were recommended. The establishment of standards and units of measure for all work performed which is susceptible of measurement was pronounced a fundamental basis of harmonious understanding between employer and employee and the foundation for economical and efficient handling of labor. The creation of a personnel department was recommended for all roads of sufficient size.

The committee suggested for further examination by the railroads of guaranteed employment or unemployment insurance, prompted by the desire to provide continued employment, freeing the employee of anxiety; and bonus payments for continued service, avoidance of lateness and absence, prevention of waste and other features of economic operation concerning which the employee may not have full realization of his obligation.

The convention had a total registration of 987, a new high record of attendance for the association. Officers elected for the coming year include: President, G. J. Ray, chief engineer Delaware, Lackawanna & Western; vice-president, C. F. W. Felt, chief engineer Atchison, Topeka & Santa Fé; treasurer, George H. Bremner, engineering department Chicago, Burlington & Quincy, and secretary, E. H. Fritch.

Multiple Core-Making Machines

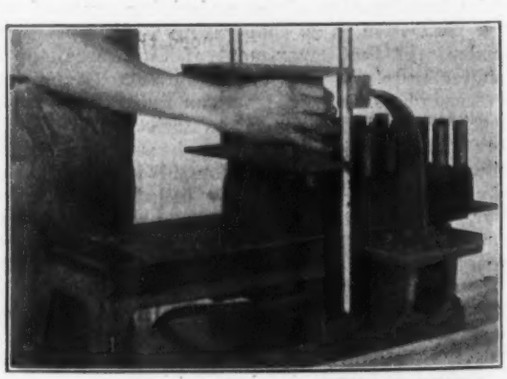
The multiple core machines illustrated, which are intended to provide increased production of cores and also cores of high quality, eliminating many machining operations on the castings in connection with which they



are used, are being marketed by the Skeppstedt-Erickson Co., Moline, Ill. They are available in two sizes or types, on both of which gang core-boxes are used. The larger machine designated as the type A is for jobs having a heavy run, while the smaller unit, type B, is for short run jobs and for core-boxes requiring more sensitive vibration.

On both machines vertical rods engage with notches in the edges of the core box, and are connected by a cross bar which carries the vibrator, vibration being transmitted to the core-box by means of the vertical rods. The latter, together with the notches in the core-box, also serve to guide the box during the drawing operation, an arrangement intended to provide a straight draw. A solid instead of a split box is usually employed, which is emphasized as eliminating the fin formed at the joint and also as resulting in longer life for the core box.

The type A machine is provided with a mechanical drawing device which is particularly useful where a long straight draw is required. A trigger arrangement sets the vibrator in operation automatically when the core-box has been placed in position on the table of the machine. The type B machine is provided with a knee valve which when pressed actuates the vibrator. This machine is equipped with a movable carriage so that after each box full of cores has been made the carriage



The Type A Core Machine for Long Run Jobs Is at the Left, the Type B Machine, Above

may be moved to make room for the next row of cores, and when the plate is filled it is placed on the core rack or in the oven. With the type A machine a whole core plate is filled by one box.

Among the advantages emphasized by the makers is that because the core-box is not fastened to the machine by screws or other clamping device, time lost in changing jobs or boxes is eliminated. All that is required is to lay the one box aside and pick up the next one. Another advantage is that the vibration is applied to the core box only, before and during the drawing operation, the vibration being most intense at the beginning of the draw and decreasing gradually as the operation is completed. The latter feature is said to result from the manner of supporting the guide rods in the machine.

Record Production of Pig Iron in United States in 1923

THE interesting details of the record-breaking year 1923 in the production of pig iron are given in a bulletin of the American Iron and Steel Institute, which shows that the total production was 40,361,146 tons, including 251,177 tons of charcoal iron. The greatest previous production was 39,434,797 tons in 1916. In 1922 there was an increase for the entire country of 63.11 per cent over 1921, and in 1923 there was an increase of 48.28 per cent over 1922. All States made an increase in 1923, the largest being Virginia, 464.77 per cent, but 1922 was a very poor year for the Virginia furnaces, as they then produced only 49,024 tons. The largest increase in tonnage in 1923 was in Pennsylvania, 5,072,832, or 52.13 per cent.

Of the leading grades of pig iron, foundry, combined with ferrosilicon, increased 62.71 per cent, while the smallest increase was in basic, with 43.02 per cent. Malleable, which in 1922 registered an increase of 129.92 per cent, increased only 49.41 per cent in 1923. Spiegeleisen increased 76.58 per cent.

Of the total production, the first half was credited with 21,016,475 tons and the second half with 19,344,671 tons.

PRODUCTION OF PIG IRON BY STATES, 1919–1923.

States.	1919.	1920.	1921.	1922.	1923.
Maine, Mass., Conn.	13,678	10,281	2,142	1,084	1,309
New York, New Jersey	2,070,288	2,601,134	968,660	1,772,325	2,951,810
Pennsylvania	12,276,585	13,983,134	6,252,766	9,731,788	14,804,620
Maryland	244,002	523,733	147,189	366,967	529,606
Virginia	319,409	429,302	67,239	49,024	276,874
Alabama	2,130,092	2,392,962	1,207,408	2,230,619	2,797,190
West Va., Ky., Texas	413,091	772,379	264,759	460,311	702,454
Tennessee	190,514	283,207	19,479	123,907	250,982
Ohio	7,102,627	8,533,470	3,799,613	6,484,162	9,347,960
Illinois	2,558,213	3,280,875	1,612,033	2,625,244	3,839,063
Indiana, Michigan	2,715,659	2,939,521	1,893,611	2,726,727	3,813,125
Wisconsin, Minnesota	605,619	711,405	226,863	381,030	724,717
Mo., Iowa, Col., Mont., Wash., Oregon, Cal.	375,587	464,584	226,364	266,716	321,436
Total..Gross tons.	31,015,364	36,925,987	16,688,126	27,219,904	40,361,146

PRODUCTION OF PIG IRON BY STATES, 1922–1923, SHOWING INCREASE BY STATES.

States.	Production—Gross tons.					
	1923.	Per cent.	1922.	Per cent.	Increase.	Per cent. increase.
Pennsylvania	14,804,620	36.68	9,731,788	35.75	5,072,832	52.13
Ohio	9,347,960	23.16	6,484,162	23.82	2,863,798	44.17
Illinois	3,839,063	9.51	2,625,244	9.64	1,213,819	46.24
Indiana, Michigan	3,813,125	9.45	2,726,727	10.02	1,086,398	39.84
New York, New Jersey	2,951,810	7.31	1,772,325	6.51	1,179,485	66.55
Alabama	2,797,190	6.93	2,230,619	8.20	566,571	25.40
Wisconsin, Minnesota	724,717	1.80	381,030	1.40	343,687	90.20
West Virginia, Kentucky	702,454	1.74	460,311	1.69	242,143	52.60
Maryland	529,606	1.31	366,967	1.35	162,639	44.32
Iowa, Colorado, Washington	321,436	.80	266,716	.98	54,720	20.52
Virginia	276,874	.69	49,024	.18	227,850	464.77
Tennessee	250,982	.62	123,907	.46	127,075	102.56
Massachusetts, Connecticut	1,309	.....	1,084	.....	225	20.76
Total	40,361,146	100.00	27,219,904	100.00	13,141,242	48.28

PRODUCTION OF COLD AND HOT AND WARM BLAST CHARCOAL PIG IRON, 1919–1923.

Kinds of iron.	1919.	1920.	1921.	1922.	1923.
Cold blast	2,113	1,734	350	.....	.....
Hot and warm blast	324,984	321,662	94,380	224,731	251,177
Total.....Gross tons.	327,097	323,396	94,730	224,731	251,177

PRODUCTION OF PIG IRON BY GRADES, 1908–1923.

Years	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
1908.	4,010,144	7,216,976	3,637,622	414,957	457,164	199,155	15,936,018
1909.	8,250,225	10,557,370	5,322,415	658,048	725,624	281,789	25,795,471
1910.	9,084,606	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911.	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912.	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913.	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914.	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915.	13,093,214	10,523,306	4,843,899	829,921	316,214	309,659	29,916,213
1916.	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797
1917.	17,671,662	13,714,732	5,328,258	1,015,579	345,707	545,278	38,621,216
1918.	18,646,174	13,024,966	5,145,260	1,117,914	393,932	726,398	39,054,644
1919.	14,494,131	9,975,934	4,916,758	1,009,049	271,286	348,206	31,015,364
1920.	16,737,722	12,062,084	5,957,782	1,310,951	318,048	539,400	36,925,987
1921.	7,753,071	5,595,215	2,568,136	457,340	112,748	201,616	16,688,126
1922.	13,841,367	7,813,203	3,976,431	1,051,495	214,210	323,198	27,219,904
1923.	19,795,590	11,677,509	6,470,013	1,571,064	327,430	519,540	40,361,146

PRODUCTION OF PIG IRON BY GRADES, 1922–1923, SHOWING INCREASE BY GRADES.

Grades.	1923.	Per cent.	1922.	Per cent.	Increase.	Per cent.
Basic	19,795,590	49.05	13,841,367	50.85	5,954,223	43.02
Bessemer and low phos.	11,677,509	28.93	7,813,203	28.70	3,864,306	49.46
Foundry and ferro-silicon	6,470,013	16.03	3,976,431	14.61	2,493,582	62.71
Malleable	1,571,064	3.90	1,051,495	3.86	519,569	49.41
Forge	327,430	.81	214,210	.79	113,220	52.85
Spiegeleisen	129,686	.32	73,443	.27	56,243	76.58
Ferro-mang.	247,031	.61	150,115	.55	96,916	64.56
All other	142,823	.35	99,640	.37	43,183	43.34
Total	40,361,146	100.00	27,219,904	100.00	13,141,242	48.28

PIG IRON MADE FOR SALE BY GRADES IN 1923.

States.	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
Mass., New York, New Jersey, Md.	85,912	107,224	1,186,168	279,491	21,824	47,089	1,727,708
Pennsylvania	827,176	616,154	1,022,982	127,227	101,572	135,592	2,830,703
Va., W.Va., Ala.	92,284	157	1,681,675	.....	32,018	10,030	1,816,164
Kentucky, Tenn.	234	31,727	222,095	625	.....	16,966	271,647
Ohio	653,647	14,193	791,676	445,376	30,583	874	1,936,349
Indiana, Illinois	348,351	87,953	316,420	339,867	.....	.....	1,092,591
Michigan, Wis., Minn., Iowa	838	10,869	557,915	277,087	595	.....	847,304
Total	2,008,442	868,277	5,778,931	1,469,673	186,592	210,551	10,522,466

METHODS BY WHICH ALL PIG IRON WAS CAST OR DELIVERED IN 1923.

States	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total. Gross tons.
Mass., New York, New Jersey, Md.	1,410,767	390,165	1,580,405	57,647	43,741	3,482,725
Pennsylvania	10,112,919	607,863	3,986,011	192,690	5,137	14,804,620
Virginia, West Va., Ala., Ky., Tenn.	1,559,975	1,816,277	444,771	196,750	9,727	4,027,500
Ohio	5,748,967	350,579	3,155,134	43,887	10,393	9,347,960
Ind., Ill., Mich., Wis., Minn., Iowa, Colo., Washington	5,873,884	373,384	2,443,552	.....	7,521	8,698,341
Total	24,706,512	3,447,268	11,639,873	490,974	76,519	40,361,146

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke*	322	230	176	406	20,874,240	19,222,999	40,097,239
Anthracite†	1	0	2	2	8,766	3,964	12,730
Charcoal	12	9	15	24	133,469	117,708	251,177
Total	335	239	193	432	21,016,475	19,344,671	40,361,146

* Includes pig iron and ferro-alloys made with electricity, electricity and coke, etc.
† Includes mixed anthracite and coke pig iron.

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN 1923.

Grades.	For sale.	For maker's use.	Total. Gross tons.
Basic	2,008,442	17,787,148	19,795,590
Bessemer and low-phosphorus	868,277	10,809,232	11,677,509
Foundry, including ferro-silicon	5,778,931	691,082	6,470,013
Malleable	1,469,673	101,391	1,571,064
Forge or mill	186,592	140,838	327,430
Ferro-manganese	88,568	160,463	247,031
Spiegeleisen	72,494	57,192	129,686
All other grades	51,489	91,334	142,823
Total.....Gross tons	10,522,466	29,838,680	40,361,146

Every Machine Piece Given Hardness Test

Subjecting Carbonized Parts to Test Before Assembly in Calculating Machine—Some Interesting Machining Operations

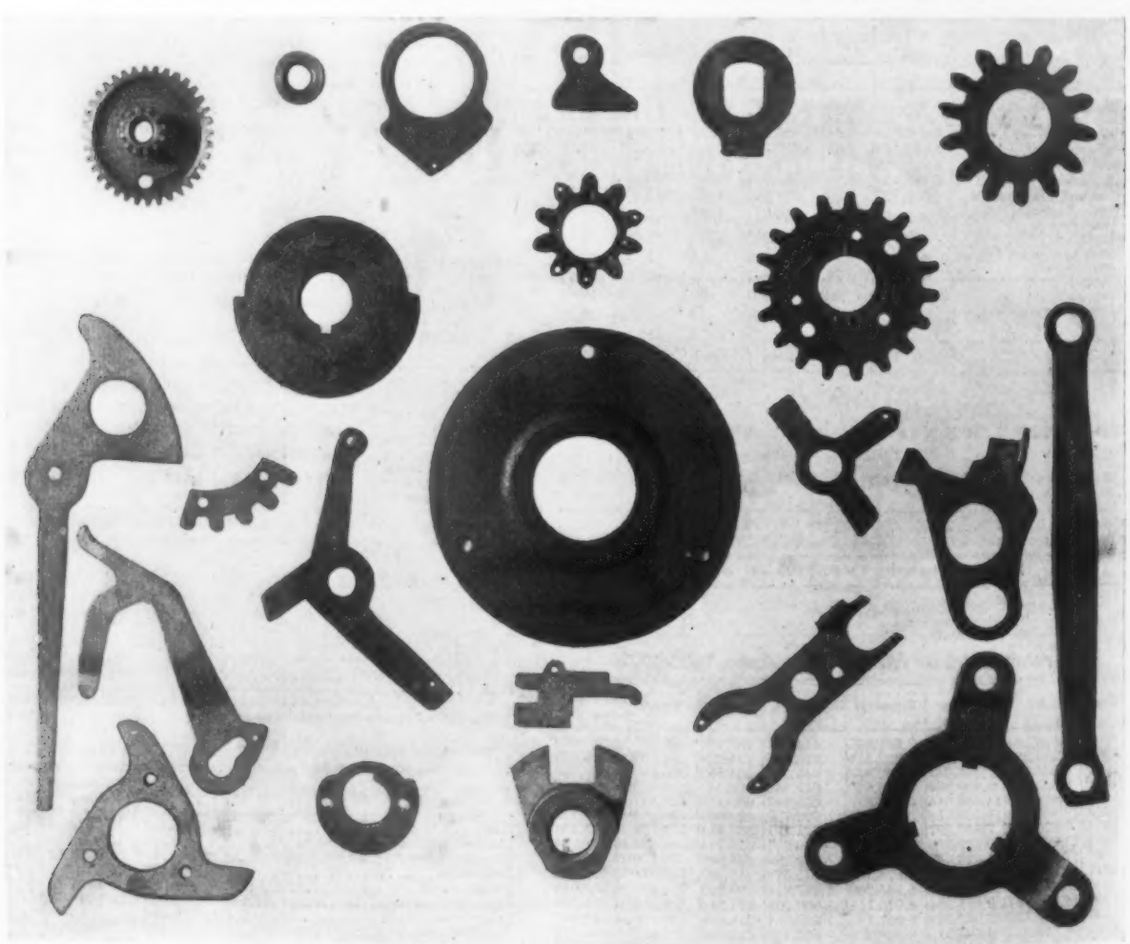
BY L. S. LOVE

IN a machine which will add, subtract, multiply, divide, extract square and cube roots and perform other functions of the slide rule, one might expect to find a rather complicated mechanism, requiring many diverse machining operations on the various parts.

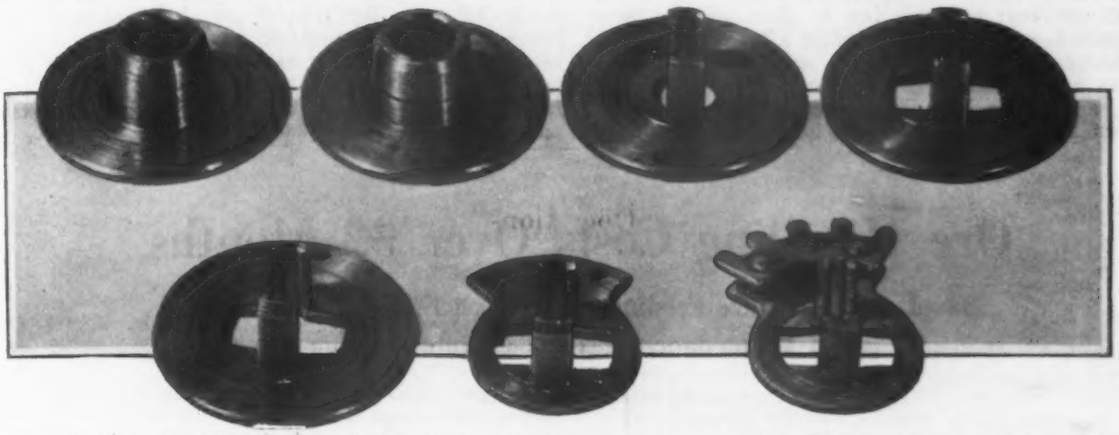
This is not the case, however, in the manufacture of the Monroe calculating machine built by the Monroe Calculating Machine Co., Orange, N. J. Most of the parts are manufactured by means of punch presses, automatic screw machines and high-speed drills. The pieces composing working parts of the machine do require considerable accuracy, which calls for the use of shaving dies in many instances in the punch presses, and a very careful checkup of tooling equipment, jigs and gages for other classes of machine work.

An example of this care is the making of a shoulder gear or gear and pinion made of one piece. The blank for this gear is made on an automatic screw machine. The gear is cut on a gear shaper, after which the hole is drilled in the web. The location of this hole is registered to bring its center line exactly on a radius between two of the gear teeth. The pinion is next cut, registering from the hole. There is only 0.040 in. clearance between the rim of the gear and side of the pinion, requiring exceptionally close setting of the shaper ram. The finished gear is then checked in a gage, registering from the hole. A sliding "Vee" pointed indicator in the gage is inserted between two of the pinion teeth to test the accuracy of the pinion with relation to the hole. This gear is shown in the group of parts illustrated.

Probably the one piece on which there is more machine work and variety of operations is the selecting gear, so called. This consists of a disk and hub turned out on an automatic screw machine. The next operation is one of broaching two opposed keyways in the bore. The blank is then transferred to an automatic milling machine, which holds a fixture having places for six blanks set in pairs. Pieces are registered in this fixture on arbors with keys which fit the two keyways. The arbor of the machine carries three pairs of gang cutters which mill away the sides of the hubs, leaving only those portions containing the key slots.



The 100 Per Cent Hardness Test, That Is a Test of Every Part of a Large Variety Does Not Deform the Pieces. Small white spots indicate points where hardness readings were made



Seven Separate Operations Are Required to Produce One Selecting Gear Unit, the Flange of Which Is Only 1½ In. when It Comes off of the Automatic Screw Machine

The next three succeeding operations are performed on punch presses and consist of first punching a semi-rectangular hole between the slotted standards, and the next operation of punching two rivet holes in the flange; these are followed by a trimming operation which removes about two-thirds of the flange. The two holes are used to rivet the hardened gear sector in place. In half the cases this gear sector consists of a single piece with spacers between it and the flange. In the other half of the cases there are several sectors containing different numbers of teeth riveted to the flange. These selecting gears are used in pairs in the machine assembly, the oblong hole in each allowing for clearance of the slotted standards of its mating piece. The shaft has four keys at each location to accommodate the two pairs of keyslots.

Probably the most interesting and unusual procedure in this shop is the hardness testing. In order that machines when placed in the hands of customers may give maximum service, it is essential that all parts subject to wear be properly hardened, since parts which are not sufficiently hardened are likely to wear, and those which are too hard are often brittle and likely to break, and in some cases the degree of hardness must be held within rather close limits. The test is not made on such parts as are subject to less wear and shock, and where a thinner case is all that is necessary, cyaniding is resorted to. The hardness test is made only on carbonized parts.

About eight months ago the first Rockwell direct reading testing machine was installed. In this machine the test is accomplished by the application of first a minor pressure of 10 kg. followed by a major pressure of 100 kg. applied through a hardened 1/16-in. ball or of 150 kg. applied through a diamond point ground to 120 deg. to the specimen mounted on the anvil of the testing machine.

The difference in depth of penetration of the ball under the heavy pressure and light pressure indicates on a direct reading dial the actual resistance of the specimen to the penetration of the ball under a known pressure. This pressure gives a correct reading and does not appreciably distort even thin pieces, the area affected being very slight, as is also the depth of penetration. The exceedingly small indentation cannot be noticed on the pieces illustrated.

After thoroughly trying this method it was found that while at first rejections increased, a careful record of the results obtained has made it possible to modify the hardening methods so that these rejections have practically ceased. The problem resolved itself into one of determining the proper hardness required for

All Carbonized Pieces Entering Into the Construction Are Passed Through a Battery of Direct Reading Hardness Testers

satisfactory service in the machine and then giving a 100 per cent hardness test to such parts as were carbonized, and not simply testing a few out of a lot.

About three or four months ago a battery of machines was installed for this purpose. Rejections on test vary, but including those parts rejected as being too soft and those which are too hard the average runs about 10 per cent. Soft parts are returned to the hardening room for rehardening, hard parts to be drawn. While this practice costs more, due to the need for an operator on each testing machine, it has been found profitable for the reason that the company is practically assured of satisfactory service from each part of all its machines in service.

Ore Handling Costs Over 32 Months

Based on Ore Bridge Feeding Three Blast Furnaces—Operating and Maintenance Costs 1.83 Cents Per Ton

BY WALTER H. BURR*

THIS is a summary of the cost of handling ore with a modern ore bridge used in connection with three blast furnaces. When I speak of handling ore, I mean taking it away from the pile where it has been dumped by a car dumper, placing it by means of an ore bridge on the stock pile and then later, when required, placing it in transfer cars from which it is dumped into the pockets, ready to be used in the blast furnace.

The bridge from which the figures were compiled has a capacity of 5500 tons of ore per day, is equipped with four 25-hp. motors on the bridge, two 100-hp. motors on trolley, and a 275-hp. motor on hoist, all motors 230 volt d.c.; hoisting speed, 270 ft. per min. and combined weight of bucket and ore 35,500 lb. The operating cycle of the hoist motor is as follows: Closing, 8 sec., 160 hp.; hoisting, acceleration 3 sec., 370 hp.; hoisting, acceleration 9 sec., 322 hp.; dumping 6 sec., 70 hp.; lowering 10 sec., 145 hp.; rest 20 sec. Peak loads of 2500 amperes are not uncommon.

The data which I have compiled cover 8 months during 1918 and the full years 1919 and 1920. In these data the cost per ton covers handling the ore but once.

	Tons		
	Eight Months in 1918	1919	1920
Ore placed on ore pile	702,256	277,938	574,291
Ore placed in transfer cars	228,722	259,822	395,548
Total ore handled	930,978	537,760	969,839
Cost for lights	$212.12	$115.89	$129.46
Repairs, labor and material	3,533.59	2,143.86	10,040.03
Oil and grease	90.57	110.42	186.71
Tools and miscellaneous supplies	82.57	307.50	177.30
Total	$3,918.85	$2,677.67	$10,533.50

Total cost of operating labor in 8 months in 1918 was $5,070. The help required varied, due to the fact that during the summer, or ore, season four men were required, but during the winter season we did not have a night gang, as enough ore could be handled in the day turn to take care of the furnace for 24 hr. This means that it cost 0.42c. per ton for maintenance and 0.54c. per ton for labor in operation, or a total of 0.96c. per ton. No record was made of power cost.

Total operating labor in 1919 was $10,045. Average cost for maintenance, 0.49c. per ton; average cost for operating labor, 1.9c. per ton; total, 2.39c. per ton. No record was made of power cost.

Maintenance cost per ton in 1920 was 1.08c.; total operating labor, $10,625.40; operating labor cost per ton, 1.09c.; total cost for maintenance and operation, 2.17c.

Cost of power during year:

611,557 kwhr. at 1c.	$6,115.57
359,301 kwhr. at 1½c.	5,389.51
Total	$11,505.08

Cost of power per ton, 1.2c.; total cost of handling ore during 1920, 3.3c. per ton.

Average cost for maintenance for the 2 years 8 months would be 0.66c. per ton. Average cost for labor in operation for 2 years and 8 months, 1.17c. Average cost of maintenance and operation for 2 years and 8 months, exclusive of power, 1.83c. Average cost for maintenance per year, $7,630.

It may be well to explain that during 1920 extensive repairs were made to the trolley, cab and main hoist resistance, which explains the noticeable increase in cost of maintenance for that year. In 1919 the operating labor cost per ton increased over the previous year, due to the increase in hourly wage and to the fact that there was not so much ore handled as during the other years, but it was necessary to have the men on the bridge all the time.

It was the policy of the company to operate the power house just the same as a separate part of the company—in other words, the power department sold power to the operating departments. They sold the power during the first period of 1920 at 1c. per kwhr. About June 1 they decided they could not take into consideration the depreciation and all operating expenses, including cost of lines, engineers and, in fact, everything that goes with the operation of the plant, and sell it for 1c. a kwhr., so they increased the price of power to 1½c. to the operating company.

The span of the bridge is 350 ft. and the lift 90 ft. The total weight of the bucket and ore was 17½ tons, total weight of ore 7½ tons.

*Electrical Superintendent, Lukens Steel Co., Coatesville, Pa. This is abstract of a paper before the Association of Iron and Steel Electrical Engineers.

St. Louis Coke & Iron Co. Leases Furnace from Mississippi Valley Iron Co.

ST. LOUIS, March 18.—The St. Louis Coke & Iron Co. has leased for an indefinite period the 400-ton blast furnace of the Mississippi Valley Iron Co., 6500 South Broadway, St. Louis. The Mississippi Valley furnace, which is owned by a company headed by Edward F. Goltra, has been idle for the last four or five years. It was relined about a year ago, and from time to time it had been announced that it would resume the making of pig iron.

Repairs have been under way at the Mississippi Valley furnace for the last week or ten days. It is expected that the first pig iron will be shipped within the next two or three weeks. The Granite City furnace of the St. Louis Coke & Iron Co. will be down for relining the latter part of the month, the first time in nearly two years.

The lease of the Mississippi Valley furnace will continue at least during the 30 to 40 days the Granite City furnace is down. Operation by the St. Louis Coke & Iron Co. beyond that period depends upon the demand for pig iron and the price it is bringing.

Employment during February in manufacturing industries of the country showed the first general increase since June, 1923, according to statistics recently compiled by the Department of Labor at Washington. Based on reports of 8222 establishments in 52 industries, there appeared an increase of 6.7 per cent in pay-roll totals, an increase of 5.4 per cent in per capita earnings and an increase of 1.2 per cent in the number of persons employed.

Achieving Safety in Lubrication

Fatty Acids Prevent Seizure of Heavily Loaded Bearings— Normal Working Friction More Important Than Abnormal Conditions

BY ROBERT W. A. BREWER*

THERE are two fundamental principles which underlie the art of correct lubrication. These are, briefly:

1. That the oil should have sufficient viscosity to maintain a film of adequate thickness under *normal* working conditions, plus sufficient additional viscosity, to prevent metallic contact of the bearings during abnormal conditions.

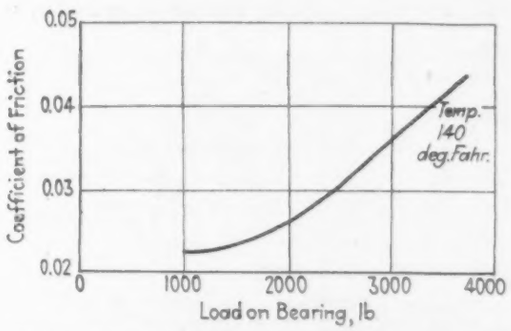


Fig. 1—Test with Castor Oil; Bearing Contact, 7 Sq. In.; Film Area, 10 sq. In.; Load, 1000 to 3700 Lb.

2. The use of an oil of only sufficient viscosity to meet these conditions, as all extra viscosity results in useless consumption of power. At high speeds, oil of a lower viscosity can be used than that required at lower speeds. This is advisable because the power loss in fluid friction is approximately proportional to the square root of the rubbing speed.

An important function of the oil is usually to act

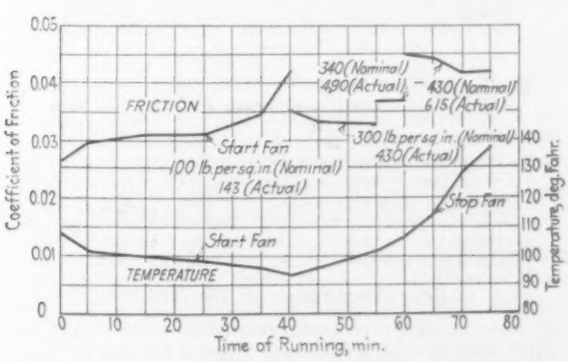


Fig. 2—Test with Castor Oil; Bearing Contact, 7 Sq. In.; Film Area, 10 Sq. In.

as a carrier of heat from the bearing. The extent to which it does this depends upon the mechanical design of the job and upon the amount of heat generated. In the first paragraph stress is laid upon the word "normal" for the reason that the normal conditions of the lubricant and of the temperature of working are so often lost sight of when oil specifications are being discussed. We cannot always determine what the normal conditions will be, but most engineers have some preconceived notions upon what they are aiming at.

When the general scheme has been worked out and the time comes to determine lubrication matters, this question arises, which can seldom be answered satisfactorily by an oil salesman: "What pressure will your oil stand under my conditions of speed, loading and temperature?" All the information forthcoming will probably relate to viscosity and some chemical properties. The question, however, is of fundamental interest to the engineer and how little is really known of this basic property? Again, supposing that the approximate load pressure is known, for *normal* conditons, what margin must be allowed for contingencies?

Here, then, are two most important factors and neither of them is known for certain. There is, of course, a large amount of "data of experience" to guide the oil buyer, but does this give the information from the standpoint of sound economics? Like many other things in the oil business, it is veiled in considerable doubt.

With so much uncertainty surrounding some of our important problems, the "safety valve" idea, which was

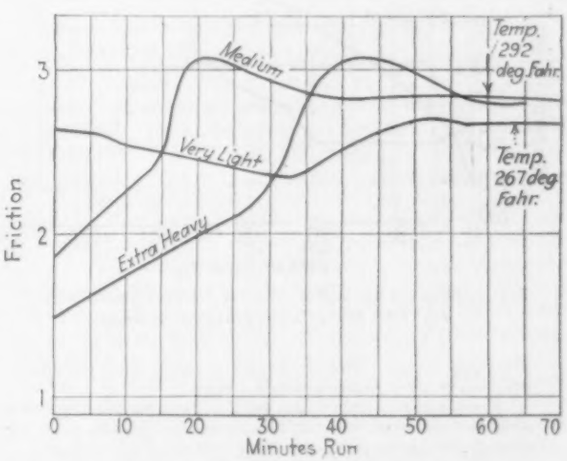


Fig. 3—Tests with Load of 3000 Lb., Initial Temperature 100 Deg. Fahr., and Varying Weights of Oil

expounded in the writer's article on "Boundary Lubrication" in THE IRON AGE of Feb. 7, should appeal rather strongly. In that article a few simple diagrams showed the thoughts as to possible arrangements of molecules in an oil film, which can be controlled by the addition of certain fatty acids to the oil. The effect is to form a very thin film on the surfaces of the metals in contact, which is believed to be formed of some intermediate substance. This boundary film is called a "safety device."

The importance of the truth of this supposition is so great, in view of the opening remarks, that tests were made to prove whether the boundary film did act as a medium for the prevention of seizure, and to what extent. A journal bearing was used as in the manner described later and it was definitely shown that, even in the absence of oil entirely, the boundary film persisted and held the surfaces apart for periods up to three hours.

What interests engineers, users of machine tools and users of heavily and intermittently loaded bearings, such as occur in most factories, is not so much the friction under abnormal conditions, but the reduction of normal working friction. According to the principles enunciated at the beginning, we must use an oil of the lowest possible viscosity, so as to reduce the fluid shear, but it must be made safe, to cope with possibilities of "partial" lubrication due to temporary fail-

*Chartered civil engineer; oil expert; Ridley Park, Pa.

ure of the supply of oil or excessive loads. The reduction of the risk of stoppage through seizure has been proved and the writer's tests can be summarized as follows:

1.—The limiting thinness of the oil has been governed in the past by the possibility of the oil being squeezed out from between the surfaces.

2.—This causes rise of temperature, further decrease of viscosity and final abrasion of the metals.

3.—When fatty acid is present in the oil to a small extent, the first manifestation is that the rise of temperature, if it does take place, is very much slower than when oil alone is present. Even if the temperature does continue to rise, the amount of friction, as measured by the tangential force at the surfaces, does not increase materially. At temperatures above 200

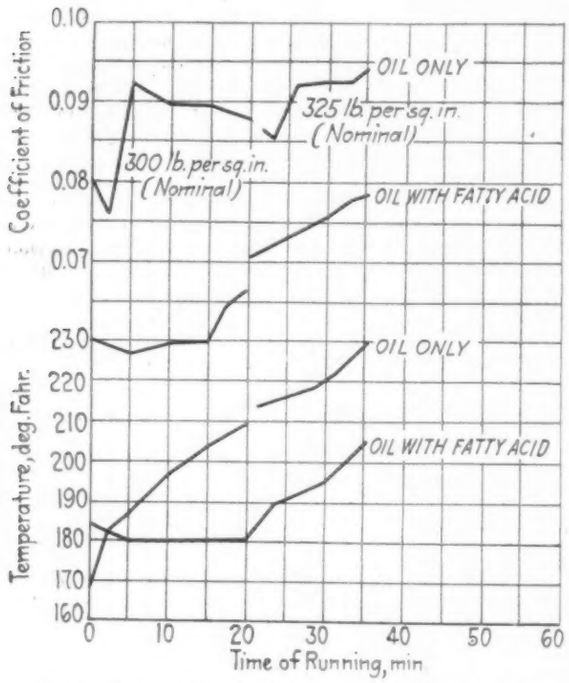


Fig. 4—Tests with Light Oil at a Surface Speed of 120 Ft. Per Min., with Natural Cooling

deg. Fahr. the friction actually falls and remains stationary over quite a large range.

4.—Extensive running, with a bearing very much overloaded, using oils of 200 seconds viscosity at 100 deg. Fahr., and light machine oils up to heavy oils, proved that friction was reduced under conditions of overload; that the bearing would not seize for a long time, and that high temperatures could be carried without risk of trouble, when the fatty acid content was present.

5.—This has been proved to temperatures above 300 deg. Fahr. to show that the film is maintained and does not evaporate or burn off. Most oils will not run at this temperature without gumming; some will stand higher temperatures, but not advisedly.

6.—It is a fact that oils can be run at higher temperatures than are usually held in practice, but it must not be forgotten that the oil temperature is actually higher than that of the metal of the bearing. The temperatures given here are bearing metal, in the cap.

7.—The boundary film is so thin that it does not squeeze out under pressure or heat; the question of viscosity does not enter the argument.

8.—For this reason, although for matters of expediency the tests were confined to oils having viscosities up to 600 seconds Saybolt at 100 deg. Fahr., extra heavy types, the conclusion is that the effects would be similar in all types of oils and greases.

9.—Some greases do contain fatty matter in another form and are used for heavy loading; oils compounded with vegetable and animal oils contain some of the active elements here discussed. We know that they give results, but are they economically prepared and applied?

10.—When a bearing having boundary film lubrication does warm up, this will be a warning and is not an immediate danger signal. The kind of friction may change from "fluid" to "semi-dry," the lubrication from "perfect" to "partial," with increase of loss, as is shown in the results at the end of this article. There will be plenty of time available in which the oil supply can be replenished or the cause of the heating investigated.

11.—The factor of safety of a neutral oil can be reduced; by the addition of fatty acid to an oil of lower viscosity than was previously employed, this thinner oil can be used for the same work and will give less friction loss.

12.—The claim that the presence of fatty acids reduces friction is generally associated with static conditions. The writer's tests were made at rubbing speeds of 120 ft. per min., practical factory conditions, except that the loads were carried up to values far in excess of ordinary limits for drop oil feed. This was done to try and reach a maximum. So far this has not been found.

13.—Not all fatty acids have the same effect and, while some of the vegetable acids have widely different molecules from others, and acids from mineral oils have again much larger molecules, the relation between the size of the molecule and the affinity for metals does not seem to be definitely determined. The smaller molecules seem to have a demulsifying effect.

14.—As general conclusions, the statement can be made that where loads are very heavy, where periods

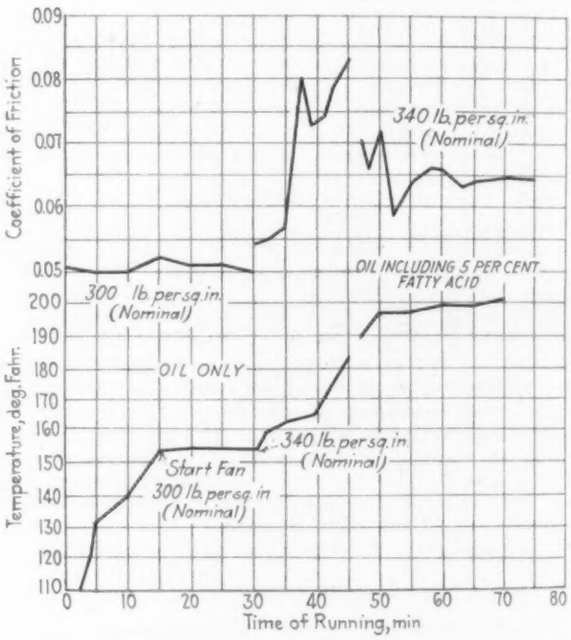

Coefficient of Friction
Temperature, deg. Fahr.
Time of Running, min
340 lb. per sq. in. (Nominal)
OIL INCLUDING 5 PER CENT FATTY ACID
300 lb. per sq. in. (Nominal)
OIL ONLY
340 lb. per sq. in. (Nominal)
Start Fan
300 lb. per sq. in. (Nominal)

Fig. 5—Tests of Same Oils as in Fig. 4, But Loaded More Heavily and Using Fan Cooling

of rest occur, and where temperatures are very high, reliance upon a boundary film will relieve the machine operator of much anxiety. Further, to the factory executive, the knowledge that important bearings are protected by a form of safety device will give a measure of confidence in the continuity of operation.

Brief Description of the Testing

As a standard of comparison the writer made runs with castor oil as a lubricant upon a bronze half bearing having a length of 5 in. and width of 2 in. This rested upon a hardened steel journal 2½ in. diameter and 5 in. long. Oil was fed into a hole in the top and carried along a groove, not a good method for any but partial lubrication work. The projected area of 10 sq. in. was reduced to approximately 7 sq. in. by grooves and low spots, and the area was carefully measured over what was considered to be the active surface. Fig. 1 shows the coefficient of friction at 140 deg. bearing temperature and loads of 1000 lb. to 3700 lb. It will be seen that, as the load drops, the curve flattens out. When the load was 1000 lb. the following relation existed between temperature and friction:

Temperature, Fahr.....	93	96	100	140
Friction, lb.....	42	34	31	22
Absolute viscosity.....	3.75	3.0	2.6	0.7

Reduction of friction as the temperature rises is clearly shown, also the fall of viscosity with the rise

of temperature is most marked. Fig. 2 brings this out at the point where "start fan" indicates that a cooling blast of air was blown onto the journal. The action of reduction of viscosity at the higher temperatures is to thin down the film, some of the oil is squeezed out, and that remaining requires less shearing force. Here we have complete film lubrication.

Next we proceed to break down the resistance of the film, if possible with this machine. Fig. 2 shows the attempt, but it will be seen that, even with the heaviest load, the friction continued to fall; there was no indication of that rapid rise of friction which would

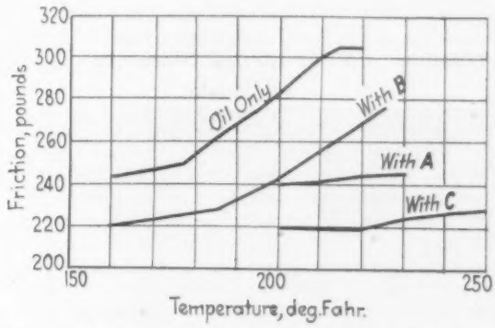


Fig. 6—Showing Reduction of Friction with Different Acids; Bearing Load, 3000 Lb.

show what was aimed at. The drop of friction is seen to be due to the rise of temperature thinning down the oil.

Three mineral oils were then chosen, having the following specifications:

Light, 200 seconds at 100 deg. Fahr., 41 at 210 deg.
Medium, 300 seconds at 100 deg. Fahr., 46 at 210 deg.
Extra heavy, 600 seconds at 100 deg. Fahr., 57 at 210 deg.

Fig. 3 shows that when these oils were used, and the load was 3000 lb. on the bearing, the very light oil gave the least friction; the light and medium oils behaved practically alike; the extra heavy oil was rather longer reaching the critical temperature. In these tests a pad was placed below the journal so that the oil would be spread and kept in contact. In each case 100 cu. cm. of the oil was used. There was 5 per cent fatty acid in each oil. The oils were loaded much above their breakdown points; for example, the medium oil gave the following frictional resistance values:

1,000	50
1,500	60
3,000	187, with pad in use

Fig. 4 gives an indication of the operation of the light oil without and with the addition of the acid. This shows on a time basis just what happens as regards the rise of temperature and the rise of friction when the oil is in its original state and when the acid is added.

Fig. 5 shows the same oil loaded to a higher value and with fan cooling, from which it will be seen that, in 15 min. after the load had been increased above a stable value, the temperature of the bearing and the friction gave every indication that seizure was imminent. Oil containing 5 per cent of fatty acid was then used; the effect was to drop the coefficient of friction from more than 0.08 to 0.065, where it remained stable, and to arrest the rise of temperature at 200 deg. Fahr.

A peculiarity is noticed, that all the oils tested reached a maximum frictional value which fell off as the temperature rose higher; the critical temperature at which this occurred varied with the different oils. For example, in the medium oil this was between 190 and 240 deg., while with the heavier oil it was between 230 and 370 deg.

The important point to the user is that, in the heating up process, these changes do not occur regularly; that is, the friction increases in steps or jerks when ordinary oil is used, probably due to some adjustment going on in the particles of metal at the contact surfaces. When fatty acid is in the oil, this action appears to be smoothed over. In the case of the heavier oil at the peak, the temperature actually dropped when the acid was added, showing that the rate of heat dissipation was balancing the rate of heat generation.

Fig 6 is that of the medium oil alone and when mixed with three different types of fatty acid. It indicates that with the acid marked *A* there is a reduction of friction of 10 per cent at least. The best result is given with *C*, a reduction of 26 per cent in the frictional loss. It is evident that the nature of the acid has a marked effect on the result and that we cannot jump at conclusions. The writer has tested other substances which have no effect in this method of testing, though they have certain properties of another character.

In this brief synopsis only a few of the lighter oils have been referred to but, as remarked at the outset, there seems to be no valid reason why the efficacy of the method of improving lubrication should not continue all along the line. The main thought is that liquids of a lower viscosity than generally supposed can be used satisfactorily. Such oils are cheaper and they can be made safe for general usage, but they should not be worked at a temperature where gumming is likely to occur.

There are several sources of suitable materials for oil treatment, but all do not give equally good results. There are many purposes in the arts and manufactures where a "different" type of lubricant is required, one that is clean in operation and lasts under all conditions. Such a lubricant is quite possible.

Decisions as to Rates on Fire Brick

WASHINGTON, March 18.—Passing upon the complaint of the Davis Fire Brick Co., et al., the Interstate Commerce Commission has handed down a decision holding that interstate rates on fire brick in carloads from Ottawa, Ill., to Chicago and points taking the same rates, or basing thereon, are not unreasonable but are unduly prejudicial to the Chicago Retort & Fire Brick Co., and unduly preferential of producers in the St. Louis district. The undue prejudice was ordered removed. It was held that rates on like traffic from the Portsmouth, Ohio-Ashland, Kentucky district are not unduly prejudicial, and the complaint of the Davis Fire Brick Co., et al., which dealt with this traffic movement, was dismissed.

The commission also prescribed a basis for reasonable rates from the St. Louis district on fire brick. The complainants in these cases are producers of fire brick at Ottawa, and at various points in the Portsmouth-Ashland district, who charged that the interstate rates on their product to Chicago and points taking the same rates, or basing thereon, are unreasonable, unduly prejudicial to the complainants and unduly preferential of producers in the St. Louis district, and that the interstate rates on like traffic from the St. Louis district are unreasonably low. The commission, in finding that the rates from Ottawa to Chicago are unduly prejudicial to the complainant and unduly preferential of producers in the St. Louis district, ordered removal of the so-called undue prejudice by the establishment of a differential from the St. Louis district of 75c. over Danville, Ill.,-Attica, Ind.

The commission points out that the effect of this finding will be to remove any alleged undue prejudice that may exist against Portsmouth-Ashland in favor of the St. Louis interests, and therefore, it dismissed the complaint of the Davis Fire Brick Co., et al.

William H. Muller & Co., 11 Broadway, New York, the parent company of which has its main office at The Hague, Holland, has established a subsidiary company by that name with offices at 2 Pine Street, San Francisco, which has taken over Thomas W. Simmons & Co., San Francisco, exporters and importers. Paul G. Leoni is president and Thomas W. Simmons, vice-president and general manager in charge of the California company, which will act as selling agent on the Pacific Coast for the company's mill connections in France, Belgium and Germany.

New Material Handling Elevator

An elevator for handling loaded trucks, wheelbarrows and similar equipment from one elevation to another and in places where the usual freight elevator would not be practical, has been placed on the market by the New Jersey Foundry & Machine Co., 90 West Street, New York.

The machine may be used for portable or fixed position work, and is suitable for serving elevated charging platforms of foundry cupolas, gas generators, grinding and mixing machines and hoppers. It may also be employed in serving mezzanine floors, between two floors, from floor to box cars and between different floors. Standard capacities range from 1000 to 6000 lb. and platform sizes from 3½ x 5 ft. to 6 x 10 ft. It may be noted from the illustration that the machine is a self-contained unit and does not require extraneous support. The platform remains level under the eccentric loading

Elevator for Portable or Fixed Position Work. Electric control automatically stops the platform at high and low points

of moving trucks and electric control is provided to stop the plaform at the high and low points.

The platform is carried by four wheels which travel within the guides, which in turn are carried on the frame of the machine. A double drum and double supporting rope are provided to keep the platform level at all points even when moving loaded trucks on and off the platform. The machine is driven by motor through a silent chain and spur gear drive. The load is held by a brake wheel carried by the extended motor shaft with two brake shoes connected by a compound lever arrangement, one end of the lever carrying the core of a solenoid brake coil. The application of electric current raises the solenoid core and releases the brake, the weight of the core being sufficient to stop the load at any point. The upper electric limit stops the platform at the upper level and the lower limit at the lower level, the latter preventing coasting in the motor and unwinding of the rope on the drum after the platform has reached the low point.

The starting and stopping of the motor, the operation of the limit and the solenoid coil are governed by fixed electric wiring, eliminating mechanical devices. Only one adjustment, that for brake shoe lining wear, is necessary. Full current is necessary to release the solenoid, so that in case of failure of current, the motor is stopped and the brake set, even if the platform is in motion.

In serving charging platforms the controller may be located at the top of the machine and operated by pendant lines so that the machine may be operated from either platform on high or low elevations. The machine may be equipped for operation either on a.c. or d.c. current and for any plant voltage.

Agreement on Reducing Sizes and Varieties of Tanks

WASHINGTON, March 18.—Reduction from 250 varieties and sizes to nine sizes and two working pressures of hot water storage tanks was agreed upon by representatives of Eastern manufacturers, distributors and consumers at a meeting here on Wednesday of last week with the Division of Simplified Practice, Department of Commerce. It was agreed that hot water storage tanks be labeled with markings as follows: "Standard.—Guaranteed for a working pressure of 65 lb." with the name of the manufacturer; "Extra Heavy—Guaranteed for working pressure of 100 lb.," also accompanied by the name of the manufacturer. These and other recommendations will be submitted within a month at a meeting of Western manufacturers which probably will be held in Chicago.

The meeting was presided over by Frank Sutcliffe, of Conshohocken, Pa., who was chairman of a central committee of the industry which has been working for more than a year preparing tentative recommendations for the elimination of unnecessary sizes of tanks. Mr. Sutcliffe reported that simplification of range boilers, adopted some time ago, has met with unqualified success, less than 3 per cent of some 200 jobbers whom he interviewed having offered objections to the elimination.

Adoption of working pressure was agreed upon in preference to the so-called "test pressure" method, which, according to reports from many sources, has proved unsuccessful. As to thickness of material, it was reported that the code committee of the American Society of Mechanical Engineers is making a study of that subject.

Coke Production in February

WASHINGTON, March 18.—Unlike the production of iron and steel, which increased somewhat, the production of by-product coke declined 3.6 per cent in February, says the Geological Survey. The total output is estimated at 2,981,000 net tons, against 3,094,000 tons the month preceding. Despite the decline, however, the output in February, 1924, established a new record for that month, and exceeded production in the corresponding month of 1923 and 1920 by 6 per cent and 27 per cent, respectively. That the decrease in total production was largely due to the fewer days in February than in January is indicated by the fact that the average daily output in February—102,805 tons—was 3 per cent larger. The percentage of production to capacity was 85.3. Of the 70 plants in existence, 65 were in active operation and five were idle. The production of beehive coke continued to increase slowly in February, and the total output is now estimated at 1,211,000 net tons. The February, 1924, output was 270,000 tons, or 18 per cent less than in the same month a year ago, and excepting only February, 1921 and 1922, is the lowest figure on record for such month.

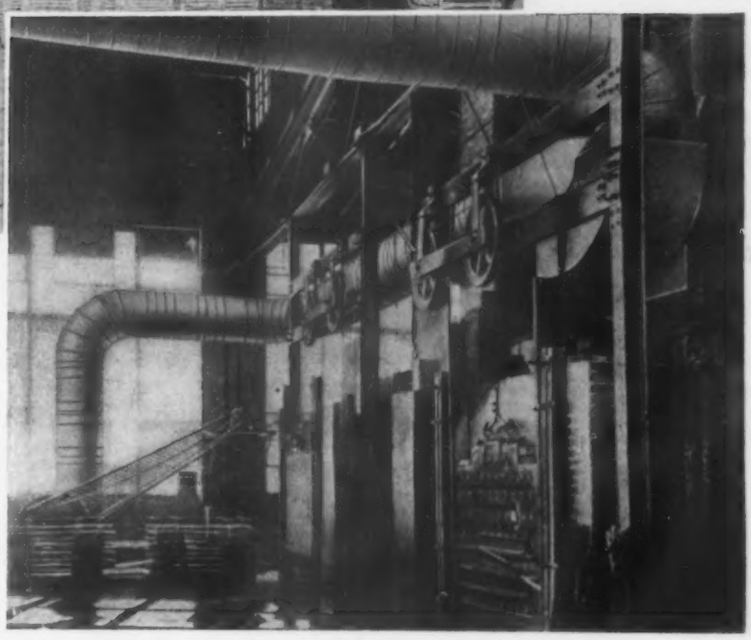
The Wellman-Seaver-Morgan Co., Cleveland and Akron, Ohio, has been awarded a contract to furnish two electric Hulett unloading machines, to be installed at Conneaut Harbor, Conneaut, Ohio. They will have a bucket capacity of 17 tons and capable of making a round trip in 50 seconds.

PLANT HEATED BY OVEN WASTE

Warm Air Circulated from Enamel Baking Kilns—Saving of 90 Per Cent Waste Heat Claimed

The conservation of fuel has been given more attention in the past two or three years than heretofore, the higher coal prices that have prevailed causing plant executives to turn their attention increasingly to this item of expense. Engineers working on problems of the utilization of waste heat point to the possibility of large savings in fuel to be had by conserving the heat that now passes to the stacks from baking ovens, kilns and heat treating furnaces, and using it for heating buildings as well as for various manufacturing processes that do not require as high temperature as the units that supply the waste heat.

Waste Heat From Enamel Baking Kilns Is Utilized to Heat a Building Having 300,000 Cu. Ft. Space



Air Circulated by a Fan Is Forced into the Duct Shown at the Left in the Lower Illustration. It passes through the heater above the kiln, the heater utilizing the waste heat from the kiln. From the heater the warm air is conducted by ducts throughout the building

An example of a waste-heat heating system is found in a recent installation in the plant of the Ingram-Richardson Mfg. Co., Beaver Falls, Pa., which is now heating a building having 300,000 cu. ft. of space by the waste heat from two kilns that are used to bake the enamel on porcelain enameled iron signs. The waste heat is taken from the outlet of oil fired muffle type kilns in which a temperature of 1800 deg. Fahr. is maintained inside the muffle and passes through a heater located above the kilns. In this is heated the supply of air that is circulated through the system and out through the factory floor.

Air is forced into the system by a motor-driven low pressure blower located at the side of the building, the air being taken either from the outside of the building or from the inside, and recirculated as desired. A 32-in. galvanized steel duct connects the fan with the heater and a distributing duct of the same size carries the heated air from the heater through the building, the air distribution being similar to that in the usual blower heating system. The heater is arranged so that the products of combustion from the kiln may be passed through the heater and thence to the atmosphere through a 16-in. stack that leads from the heater to the roof or they may be passed around the heater to the main smoke stack at the side of the oven. The control is by means of carborundum dampers in the flues.

The heater is of the recuperative type, 4 x 4 x 4 ft. in size. The heating surface consists of a large number of interlocked tubes of special shape arranged so that the products of combustion pass up vertically between or around the outside of the tubes while the air that is being heated passes horizontally through the inside of the tubes. The system was installed by the McCann-Harrison Corporation, Cleveland, and the heater is that corporation's standard type of heater with the elimination of a combustion chamber and burners.

It is stated that this heater saves 90 per cent of waste heat and that the average heat recovery is 1,500,000 B.t.u. per hour. In a test of the system, air entered the fan at 38 deg. Fahr. and after passing through the heater entered the hot air duct at 150 deg. The temperature of the gases had been reduced on leaving the heater to 115 deg. The amount of air circulated by the fan is 12,500 cu. ft. per min. It is said that sufficient heat is supplied from one kiln to heat the building but that the heater is connected to two kilns so that the system can be used in case one kiln is shut down for repairs.

In addition to heating buildings this system of waste heat utilization may be used for supplying hot air for drying, japanning, baking and for other processes requiring air at any temperature up to 600 deg.

Of the 1335 million metric tons of coal produced in the principal countries of the world in 1923, the share of the United States was nearly 581 million tons. Great Britain supplied 283 million tons. World production in 1922 was 1223 million tons and in 1921 it was 1132 million tons. The percentage of the United States of the total was 43½ in 1923, 35½ in 1922 and 40½ in 1921.

Most Profitable Year of United States Cast Iron Pipe & Foundry Co.

The United States Cast Iron Pipe & Foundry Co., in its pamphlet report issued to stockholders on March 13, showed net profit during 1923 of $3,471,268 after taxes, depreciation and interest, marking the most profitable year in the company's existence. After deducting 7½ per cent dividends paid on preferred stock there remained $21.42 per share earned on $12,000,000 in outstanding common stock. These figures compare with net profit in the previous year of $1,042,242 and $1.52 per share earned on common stock.

Total tonnage made, sold and shipped during 1923 was the largest in the history of the company. According to the report, "the year brought a release of tonnage held back by the war and the aftermath of the war."

President N. F. S. Russell told stockholders that labor conditions during the year were far from ideal. "Yet," he declared, "by unremitting effort, the total complement of men was fairly well maintained at most of the plants. Losses were high from inefficient workmanship, due to the necessity of constantly recruiting and training new men. This condition was unusually acute in some of the Southern plants, due to the Northern migration of the negro. It has been necessary to purchase and erect houses at that plant (Burlington) and it is hoped that by this means the men secured may be held."

"During the year," he continued, "much has been accomplished in solving some of the manufacturing problems presented by this new process (de Lavaud), and much progress has been made in the standardization of operations. Many tests have been made in respect to the pipe itself, by the company, independent testing laboratories, and interested customers; all of these tests have resulted most favorably to the de Lavaud pipe."

Comparative income accounts for 1923 and 1922 follow:

	1923	1922
Net after operation and plant costs	$3,995,794	$1,497,865
Other income	66,905	85,193
Total income	$4,062,699	$1,583,058
Depreciation	472,936	439,647
Interest	118,496	121,169
Net profits	$3,471,267	$1,022,242
Preferred dividends	900,000	600,000
Common dividends	60,000	.....
Surplus	$2,511,267	$422,242
Profit and loss surplus	5,920,863	3,409,596

Scrap Rate Declared Unreasonable

WASHINGTON, March 18.—Examiner P. F. Gault, in a tentative report just made public, has recommended to the Interstate Commerce Commission that the rate of $9.05 on manganese steel scrap, in carloads, from New Castle, Del., to Chicago Heights, Ill., is unreasonable to the extent that it exceeds $6 per long ton, minimum 50-lb. Complaint against the rate was brought by the Manufacturers' Association of Chicago Heights, in behalf of the American Manganese Steel Co., producers of manganese steel at Oakland, Cal., New Castle, and Chicago Heights. At the New Castle plant, steel is manufactured by the converter method and at the Chicago Heights plant by the electric furnace process.

The company desired to use manganese steel scrap from its New Castle plant at the Chicago Heights plant, but maintained that this was impracticable because of the high freight rate and that to permit a movement a rate no higher than $6 is required.

Refractory materials in steam boilers and other industrial furnaces is to be discussed at a section meeting of the American Society of Mechanical Engineers, at the Chamber of Commerce Building, Atlanta, Ga., on March 21, by A. F. Greaves-Walker, vice-president Stephens Brothers & Co. and president of the Ceramic Society.

Pig Iron Consumption in the South Shows Large Increase

The Matthew Addy Co., Cincinnati, in its market report of March 8 says in part:

"One of the most notable things in the iron trade is the immense expansion of consuming capacity in the South. A furnace company that ten years ago sent all of its iron north of the Ohio River at present is selling to local customers 81 per cent of its make—only 19 per cent is going North. Another Southern company is selling 94 per cent of its pig iron to be used immediately in the Birmingham district. It used to be that Southern iron had a national distribution and its prices fixed the market for the rest of America. In those days the South had preferential railroad freight rates that greatly helped in the wide distribution of its iron.

"The market continues to be extremely competitive. There is much close figuring and careful calculation on tonnages. No one is over-buying and the tendency to keep close to shore is evident."

Improvements at Pueblo Planned by Colorado Fuel & Iron Co.

The Colorado Fuel & Iron Co. is completing plans for the improvement and expansion of its mills at Pueblo, Colo. Considerable preliminary work is necessary before specifications can be made, but it is planned to award contracts in the spring for equipment which will cost approximately $3,000,000. Alterations will be undertaken in such a way as to interfere as little as possible with regular operations and it is estimated that improvements will require two years for completion.

New equipment will include the installation of electric precipitators for cleaning blast gas; new power plant, including high pressure boilers and superheaters; turbo-blowers or blast furnaces in place of reciprocating engines; generating plant, consisting of turbo-generators, and substitution of electrical drives in some rolling mills for steam engine drives.

Proposed Buffalo-Fort Erie Bridge

BUFFALO, March 18.—The decision of the Canadian National Railways not to rebuild the International railroad bridge between Black Rock, N. Y., and Bridgeburg, Ont., or equip it with a vehicular passageway, removes a barrier which, it is expected, will result in work being begun on another steel bridge across the Niagara River before the end of this year.

Backers of the Fort Erie & Buffalo Bridge Co., which proposes to build a vehicular bridge across the Niagara, two miles south of the International, are now prepared to proceed with their plans to secure, first, enabling legislation from the United States Congress, and second, a permit from the United States War Department. All the steps necessary so far as Canada is concerned have been taken. The congressional bill is expected to be passed before this session closes.

Plans for the building of the Buffalo-Fort Erie bridge show that the structure will cost $3,000,000. It is expected that it will be strictly a vehicular bridge.

Ford Plant May Be Built at Buffalo

BUFFALO, March 18.—On the assumption that Henry Ford will build a branch factory in Buffalo on property on which he now holds options, the Buffalo City Council has gone on record as favoring the abandonment by the State of a portion of the old Erie Canal from Parish Street, Buffalo, to the city line. The land on which Mr. Ford has options lies just north of the International bridge on the west bank of the old canal. Abandonment of the canal is necessary to permit the laying of tracks and switching facilities.

Mr. Ford, according to representations made to the City Council by the Chamber of Commerce, is reported to be considering the establishment of a plant capable of employing 2000 and of turning out 600 cars a day.

HANDLING OF GAS CYLINDERS

Rules Prepared for Prevention of Accidents in Using Oxygen, Acetylene and Hydrogen Gases

Rules for the safe handling of cylinders have been recently prepared by the Gas Products Association, 140 South Dearborn Street, Chicago, an association made up of oxygen and acetylene gas producers, and makers of welding and cutting apparatus and accessories. The rules, which cover oxygen, acetylene and hydrogen gases, are given below.

OXYGEN

1. Compressed oxygen plus oil is explosive. Do not allow oil or grease to come in contact with valve, regulator or other portion of the cylinder or apparatus.

2. When shipping empty oxygen cylinders to manufacturer, the lower portion of the green tag attached to cylinders should be removed at the perforated line. Any green sticker label found pasted to the cylinder should be removed. Bill of lading should specify that the cylinders are empty and serial numbers of the cylinders should be noted thereon.

3. Cylinders of oxygen, except those in actual use and in excess of approximately one day's supply required in any one department or point about the shop, should be stored in a place where they will not be tampered with by unauthorized persons.

4. Oxygen cylinders should be stored in a safe, dry place, where they will not be exposed to the heat of stoves, radiators, furnaces, or in the direct rays of the sun. Heat will increase the pressure and it may cause the safety plug or disk to melt or blow, thus allowing oxygen to escape, resulting in waste. If the escaping oxygen comes in contact with even the smallest flame a quick raging fire is liable to result.

5. Cylinders of oxygen are never to be stored in a room used for the storage of calcium carbide, cylinders of dissolved acetylene or other fuel gases, or with acetylene generators.

6. Open flames of any description shall not be employed in any building used for the storage of oxygen cylinders.

7. If cylinders are stored on the ground or open platforms, such location should not be adjacent to points where there is a large amount of combustible material.

Note:—While oxygen itself will not burn, its effect in aiding combustion, once a blaze is started, makes it important that rules 4 to 7 inclusive be carefully observed.

ACETYLENE, HYDROGEN

1. When cylinders of dissolved acetylene, hydrogen, liquid fuel gases or vapors are not in use, outlet valves shall be kept tightly closed, even though cylinders may be considered empty, and valve caps replaced.

2. Cylinders should be stored in a safe, dry, well-ventilated place where they will not be unduly exposed to the heat of stoves, radiators, furnaces, or the direct rays of the sun. Heat will increase the pressure, or it may melt the fusible safety plug with which most cylinders are provided and which melts at a temperature of approximately 212 to 220 deg. Fahr.

3. No open flame, grinding tools, or spark-emitting devices shall ever be used within the storage building or compartment, and all artificial lights shall be incandescent electric and shall be installed in accordance with the "National Electrical Code for Rooms in Which Inflammable Vapors May Exist."

Electric light switches, telephone and all other apparatus which may cause a spark must be located on the outside of building.

All lamps shall be inclosed in vapor-proof globes of the marine type.

4. Cylinders of dissolved acetylene shall always be stored standing upright with valve end up.

5. When shipping empty dissolved acetylene cylinders and other fuel gas cylinders to manufacturers, lower portion of red shipping tag attached to cylinders should be removed at the perforated line. Any red sticker labed found pasted to cylinder wall should also be removed. Bill of lading should specify that the cylinders are empty, enumerating the type and individual numbers of such cylinders.

6. Under no circumstances attempt to transfer acetylene from one cylinder to another and never attempt to compress acetylene into a cylinder. This work should only be performed by acetylene charging plants, and under conditions which comply with Interstate Commerce Commission regulations.

GENERAL

1. Oxygen cylinders and acetylene, hydrogen or other fuel gas cylinders shall not be transported or lifted by crane or derrick except when they are in a cradle or substantial stand, and cylinders shall never be handled with electromagnets or with rope or chain slings.

2. Cylinders should be handled carefully, should never be dropped, and should be placed so they will not fall nor be struck by other objects. Knocks, falls, or rough handling are liable to damage the cylinder, valve or fuse plugs, and cause leakage, and may even result in an explosion.

3. When exhausted cylinders shall be returned as rapidly as practicable to the storage building or place, and from there to the manufacturer, empty cylinders should be marked EMPTY and stored apart from full cylinders to prevent confusion. Valve protection caps must be replaced.

Malleable Castings in January

WASHINGTON, March 17.—The Department of Commerce announces statistics on the production of malleable castings manufactured for sale by months, May, 1923, to January, 1924. The returns indicate only those castings manufactured for sale as such and do not include those used in the plant or finished and sold as other products.

Figures are also shown comparatively for June, July, August, September, October, November and December, covering the operations of 107 identical plants for which reports were received each month.

Month and Year 1923	Plants Reporting (No.)	Total Production (Tons)	Total Shipments (Tons)	Orders Booked (Tons)	Monthly Capacity of Plants (Tons)	Per Cent of Total Capacity Operated
May	99	64,726	62,806	52,898	91,174	71.0
June	109	65,168	64,608	42,067	96,240	67.7
July	112	57,881	60,102	41,723	98,241	58.9
August	116	68,069	65,405	39,830	103,068	66.0
September	116	60,930	59,396	38,636	101,750	59.9
October	116	62,238	59,129	48,621	103,837	59.9
November	125	52,727	49,426	37,231	107,350	49.1
December	126	49,724	46,664	45,012	106,825	46.5
1924						
January	127	64,379	66,479	73,964	109,798	58.6

Comparative Summary for 107 Identical Plants

Month and Year 1923	Plants Reporting (No.)	Total Production (Tons)	Total Shipments (Tons)	Orders Booked (Tons)	Monthly Capacity of Plants (Tons)	Per Cent of Total Capacity Operated
June	107	63,298	62,888	39,814	94,840	66.7
July	107	54,433	55,922	39,131	94,826	57.4
August	107	63,038	60,207	36,753	94,858	66.5
September	107	56,024	54,378	35,452	93,565	59.9
October	107	56,798	54,221	43,978	95,652	59.4
November	107	47,112	44,215	34,817	95,801	49.2
December	107	44,586	41,328	40,800	94,751	47.1
1924						
January	107	56,278	58,504	64,058	97,049	58.0

To Discuss Employee Representation

Administration of employee representation plans will be the major topic of the convention of the plant executives' division of the American Management Association, 20 Vesey Street, New York, to be held at the Hotel Cleveland, Cleveland, May 29 and 30. The committee in charge includes E. Z. Steever, General Electric Co.

The Chicago Branch of the National Metal Trades Association held its annual meeting at the Mid-day Club, Chicago, on Thursday evening, March 6. The following officers were elected for the coming year: President, Charles H. Strawbridge, Goodman Mfg. Co.; vice-president, Henry Beneke, Beneke & Kropf Mfg. Co.; secretary, Paul Blatchford; treasurer, Charles E. Finkl, treasurer A. Finkl & Sons Co. The principal speaker was George A. Ranney, vice-president International Harvester Co., who spoke on the subject of agriculture and industry. Dudley Taylor, general counsel, Employers' Association of Chicago and the Associated Employers of Illinois, discussed the aims of the bodies which he represents.

"Transfer and Promotion Among Office Employees" and "Tests for Stenographers" are two reports issued recently by the American Management Association, 20 Vesey Street, New York. The former, known as office executives' series No. 1, is 32 pages in length, and the latter, known as office executives' series No. 4, covers 12 pages.

ADVICE FOR ASSOCIATIONS

Address of Nathan B. Williams Indicates What Activities Are Proper

ST. LOUIS, March 19.—Speaking today on "Trade Associations and Government" before the annual convention of the Refractories Manufacturers' Association, at the Chase Hotel, Nathan B. Williams, of Washington, associate counsel of the National Association of Manufacturers, strongly urged continuance of legitimate trade association work. Mr. Williams stressed the vital importance of this work and enumerated a number of practices which he said admittedly are legitimate activities. The activities he named included such work as combined effort to promote the use of products; dealing with engineering and trade problems to advance production; providing for arbitration and settlement of trade disputes; carrying on educational work; and experimental and research work.

Illegal Practices

Mr. Williams said that there are other practices indulged in by some associations in the past about which there exists slight doubt that such practices are in contravention of existing law. Among these, he said, are agreements and combinations to fix and maintain uniform or basic list prices and by combination or agreement to establish and fix lists of preferred dealers or purchasers. He enumerated other activities, but left for consideration the vital questions of trade statistics and cost accounting. He asserted emphatically that the collection and publication of unidentified current trade statistics are not per se unlawful. He declared that trade statistics might, however, be used for unlawful purposes. In this connection, he referred to the recent exchange of notes between Secretary of Commerce Hoover and Attorney General Daugherty, in which the latter expressed the opinion that information should be distributed strictly through a responsible medium like the Department of Commerce and associations be prohibited from distributing it among its membership.

Test Suit Suggested

Mr. Williams said it has been difficult to determine whether this is to be construed as the view of the Attorney General of the legal limits within which such associations may operate or as an expression of the policy which the Attorney General feels the association should be directed to pursue. If it is the view of the Department of Justice that this expresses the legal limits, Mr. Williams declared, it would then seem to be a duty resting most seriously upon the department to single out an association engaging in this activity, unrelated to any other circumstance, and to bring a suit in the courts to test this single question.

"I am advised that the Department of Justice has been challenged to pursue this course; that so far it has declined, indicating a very serious doubt in the minds of its officers as to the possibility of successfully maintaining such an action," said Mr. Williams. "In my own mind there exists no doubt that no suit can or ever will be successfully prosecuted in the courts of the United States. It is my judgment, and my advice is, that legitimate trade associations should continue their statistical and other activities without reference to the above mentioned 'informal' correspondence; that in conducting their activities they be careful not to transgress the well known inhibitions of existing law, in that they do not misuse their statistical and other trade information in promotion and furtherance of any agreement or conspiracy to fix prices, limit production, restrict sales, divide territory, or otherwise restrain lawful competition in commerce."

Use Real Costs

In pointing out the necessity of accurate and complete cost accounting, Mr. Williams warned that trade associations should use costs that are real and should avoid all standard, averaged or fictitious costs. The use of such costs, he said, almost certainly implies a combination in restraint of lawful commerce.

Action of Conference Reflected

The views expressed by Mr. Williams reflect the action of a conference of attorneys held in Washington on Feb. 28, at the invitation of James A. Emery, counsel of the National Association of Manufacturers, relating to legitimate operations of trade associations. The conference was subsequently directed to the consideration of means through which to obtain a clarification of the right of such associations to gather and distribute information and statistics.

Institute of Metals Technical Program

The program for the annual general meeting of the Institute of Metals, held in London, March 12 and 13, was as follows:

"The Relation Between the Tensile Strength and the Electrical Resistivity of Commercially Pure Copper," by W. E. Alkins.

"The Brittle Ranges in Brass as Shown by the Izod Impact Test," by D. Bunting.

"The Cadmium-Lead-Zinc System," by Maurice Cook.

"The Relative Corrosion of Zinc and Lead in Solutions of Inorganic Salts," by J. Newton Friend and J. S. Tidmus.

"Determination of the Thermal Coefficients of Expansion of Some Commercial Metals and Alloys," by J. Newton Friend and R. H. Vallance.

"Copper-Zinc Alloys which Expand on Solidification," by K. Iokibe.

"The Equilibrium Diagram of the Copper-Tin System," by M. Isihara.

"The Constitution of the Alloys of Copper and Cadmium," by C. H. M. Jenkins and D. Hanson.

"X-Ray Studies on the Copper-Aluminium Alloys," by E. R. Jette, G. Phragmen and A. F. Westgren.

"The Tensile Properties of Aluminium at High Temperatures," by Thomas Martin.

"The Investigation of a Fatigue Failure of Brass Tubes in a Feed Water Heater—with a Consideration of the Nature of Fatigue," by W. E. W. Millington and Prof. F. C. Thompson.

"The Effect of Casting Temperature on the Physical Properties of a Sand-Cast Zinc-Bronze," by Francis W. Rowe.

"The Aluminium-Copper Alloys. Alloys of Intermediate Composition," by David Stockdale.

"Note on the Effect of Cold-Drawing and Annealing on Some Electro-chemical Properties of a Low-Tin Bronze," by Stuart H. J. Wilson.

The autumn meeting will be held in London, Sept. 8 to 11.

State Safety Congress to Be Held at Harrisburg

HARRISBURG, March 17.—A State safety conference has been called by Dr. Royal Meeker, secretary of Labor and Industry, to be held in the hall of the House of Representatives here on March 26. "This conference," Dr. Meeker's announcement says, "is called to consider practical methods to reduce accidents in industry, and I hope every establishment in the Commonwealth will be represented."

The announcement of the conference carries a statement showing figures on industrial accidents in Pennsylvania in 1923. It shows that 2412 employees were killed, 1167 were permanently injured, 104,205 were seriously injured, and 92,651 were less seriously injured.

These accidents result in a loss of more than 2,691,600 days by employees and a resulting wage loss of $13,354,000. Compensation paid amounted to $13,143,393.

The address of welcome will be made by Governor Gifford Pinchot. Dr. Meeker will then speak on "Lessons to Be Derived from Pennsylvania's Experience." W. E. Jarrard, safety engineer of the American Car & Foundry Co., will speak.

At the final session in the evening, a playlet, "Scene in a Tool Room," will be presented by employees of the Edgar Thomson Works of the Carnegie Steel Co. A

demonstration of "Industrial Lighting" will be given by F. L. Rice of the Edison Lamp Works.

Invitations have been extended to 8000 employers, chambers of commerce, boards of trades and employees' organizations throughout the State. The meeting comes as a climax to a State-wide program evolved by Secretary Royal Meeker to reduce the ever growing list of accidents in the industrial plants. Pennsylvania, in common with the other States of the Union, has experienced an upward trend in the number of accidents that maim, kill and incapacitate employees. Meetings have been held in the larger cities of the State in the effort to awaken employees and employers alike to the need of observing the utmost caution in their daily work.

Convention of Sales Executives

A two-day convention of the sales executives' division of the American Management Association, 20 Vesey Street, New York, will be at the Hotel LaSalle, Chicago, April 10 and 11.

There will be five topics discussed at two forenoon meetings. These will include "Cooperative Research in Sales Management," "Sales Research Departments," "Sales Personnel Department," "Holding Sales Conferences," and "Conducting Sales Contests." At the luncheon meetings, "Getting Salesmen to Use Advertising" and "Coordinating Sales, Finance and Production," will be discussed, and continued at each of the two afternoon sessions.

Other topics at the afteroon sessions include "Guiding Principles in Training Salesmen," "Preparation and Proper Use of the Sales Manual," "Compensation of Salesmen" and "Sales Budgets."

At the banquet, to be held April 10, there will be addresses on "The Business Outlook" and "Strength and Weakness of Sales Managers."

International Management Congress to Be Held at Prague

An international management congress under the auspices of the Government of Czechoslovakia will be held at Prague during July, following the world power conference in London.

American engineering societies will unite with the Czechoslovak Society of Engineers and Architects. The Prague invitation was transmitted by the Masaryk Academy to the engineering societies of this country through the American Engineering Council, of which James S. Hartness, president Jones & Lamson Machine Co., Springfield, Vt., is president. Acceptances have been received from the four founder societies of civil, mining, mechanical, and electrical engineers.

Management problems in manufacturing and allied pursuits will be discussed, the program embracing the technique of organization and management, office organizations, management control, labor relations, elimination of waste, cost accounting as a factor in production and control, and motion and time studies. American and Czechoslovak engineers will deliver addresses. Delegates will attend from Poland, Jugoslavia and Bulgaria and other central European countries.

Building Interests in St. Louis Organize

ST. LOUIS, March 18.—The Associated Building Interests of St. Louis has been organized so that "demoralizing wage increases be stopped, a buyers' strike avoided and the building industry of St. Louis stabilized." The association has 355 members, who employ 13,000 of the 16,000 building craftsmen. It is the most extensive attempt ever made in St. Louis to group employers of building craftsmen into one body.

Presidents of the following employers' groups have signed the constitution and by-laws: Master Builders' Association, Master Plumbers' Association, Master House Painters and Decorators' Association, Master Insulators' Association, Cement Contractors' Association, Electrical Employers' Association, Contracting Plasterers' Association, and St. Louis Sheet Metal Contractors. Two other organizations are expected to join.

An advisory council, to be made up of representatives of the American Institute of Architects; the Association of Engineers; the Society of American Bankers and the Associated Real Estate Exchange, is provided for. The association has a group council made up of three representatives of employers of each of the 13 crafts in the body.

Two crafts—the Iron Workers and the Cement Finishers—have reached agreement with the association.

New England Foundrymen's Association

Because of a blizzard the March meeting of the New England Foundrymen's Association, held Wednesday evening, March 12, at the Exchange Club, Boston, was lightly attended, only 55 members and guests being on hand. Norman Russell, president, presided. Applications for membership by the Berlin Foundry & Machine Co., Berlin, N. H., and the New England Foundry & Machine Co., Campello, Mass., were favorably acted upon.

William S. Price, New York office Tide Water Oil Sales Corporation, was the guest of the evening. He gave an illustrated talk, largely concerning his company's properties in New Jersey and elsewhere, and showed views of various other plants. The talk and pictures had little to do with the foundry industry. During the evening, Mr. Price in behalf of his company presented those present with briar pipes.

To Discuss Mill Screw-Down Motors

F. D. Egan, electrical engineer, Lackawanna plant, Bethlehem Steel Co., has prepared a mechanical and electrical analysis of blooming mill screw down motors. His conclusions are based upon oscillograph records and data obtained in tests made in connection with screw down motor installations. His data are said to reveal some startling and interesting discoveries. He has developed a formula to eliminate guess work in connection with the screw down motors and the subject will be presented at a meeting of the Association of Iron and Steel Electrical Engineers at the William Penn Hotel, Pittsburgh, Saturday, March 22. The session will be preceded by a dinner at 6.30 in the hotel.

COMING MEETINGS

April

American Association of Oil Burner Manufacturers. April 1, 2 and 3. Annual meeting, Hotel Chase, St. Louis. Leod D. Becker, 518 Bank of Galesburg Building, Galesburg, Ill., secretary.

Association of Iron and Steel Electrical Engineers. April 2 and 3. Fuel saving conference, William Penn Hotel, Pittsburgh. John F. Kelly, Empire Building, Pittsburgh, secretary.

National Metal Trades Association. April 23 and 24. Annual convention at the Hotel Astor, New York. Louis W. Fischer, Peoples Gas Building, Chicago, secretary.

American Electrochemical Society. April 24 to 26. Spring meeting at Philadelphia. Dr. Colin G. Fink, Columbia University, New York, secretary.

American Gear Manufacturers' Association. April 28 to 30. Spring meeting, Lafayette Hotel, Buffalo. T. W. Owen, 2443 Prospect Avenue, Cleveland, secretary.

Institute of Metals Division of American Institute of Mining and Metallurgical Engineers and the American Foundrymen's Association. April 28 to May 3, inclusive. Annual convention, Hollenden Hotel, Cleveland. C. E. Hoyt, 140 South Dearborn Street, Chicago, secretary.

Society of Industrial Engineers. April 30 to May 2. Annual convention at Buffalo. George C. Dent, 608 South Dearborn Street, Chicago, general manager.

Rerolling Old Railroad Rails Into Rods

Methods of Operation in Rolling with Oblique Pressure—Reduction of Sectional Area in Rolling—Influence of the Steel Strength

BY A. NOELL*

THOUGH the sale of rods of from 90,000 to 100,000 lb. per sq. in. strength would present difficulties in Germany, mine rails of this strength easily find buyers. After the war such fluctuations in price occurred that the difference in price between scrap and finished product for a time exceeded American relations, which proved the rerolling of old rails unconditionally profitable. For this reason a description of this process would appear justifiable, especially as a new disclosure in THE IRON AGE† shows that this process has come to stay.

All the articles make it appear that rerolling of old railroad rails into mine rails is an American invention; this is not correct. At the beginning of the "eighties" the German civil engineer, Hugo Dickmann, investigated the reworking of old railroad rails and rail ends, and even developed a suitable pass design for rerolling to mine rails and sleepers and carried out the process at the Dortmunder Union Steel Works.

In the Hugo Dickmann patent pamphlet No. 30,769 of June 10, 1884, is the following: "According to the present customary method, cut railroad rails pass through a so-called open upsetting pass by reducing their height. These vertical lying edgers have the disadvantage that the web of the rails, whose profile is to be rolled out to a smaller profile, actually is not upset in itself, but bends, that is deflects to the side in an open pass. By this impropriety the web in the following passes is folded together, instead of being elongated. The present invention consists of an edging pass lying diagonal to the roll axis, which is so constructed that the upper, as also the lower, roll each on one side form a grooved, and on the other side a tongued, roll.

"By this peculiar construction it is possible to make

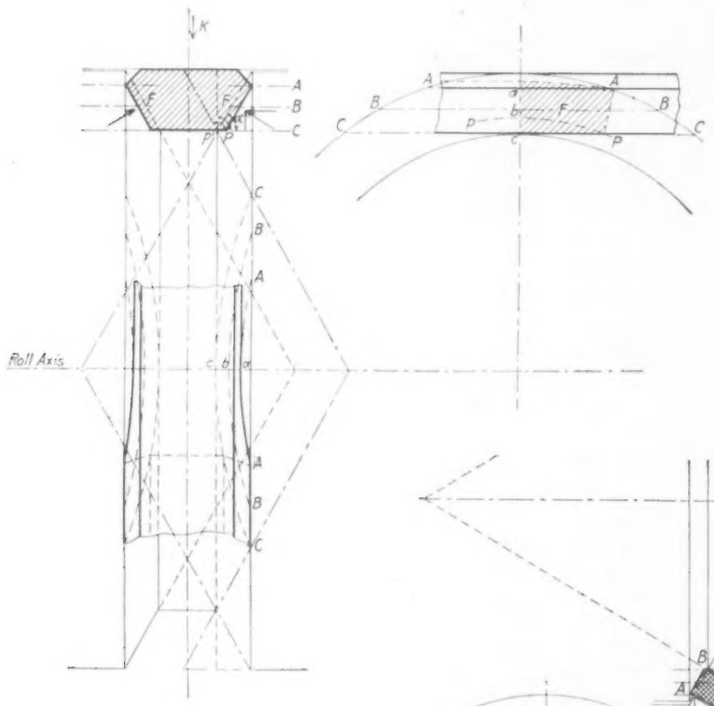


Fig. 1—Rolls with Indirect Draft or Pressure in One Roll, Showing Lines of Force (Left)

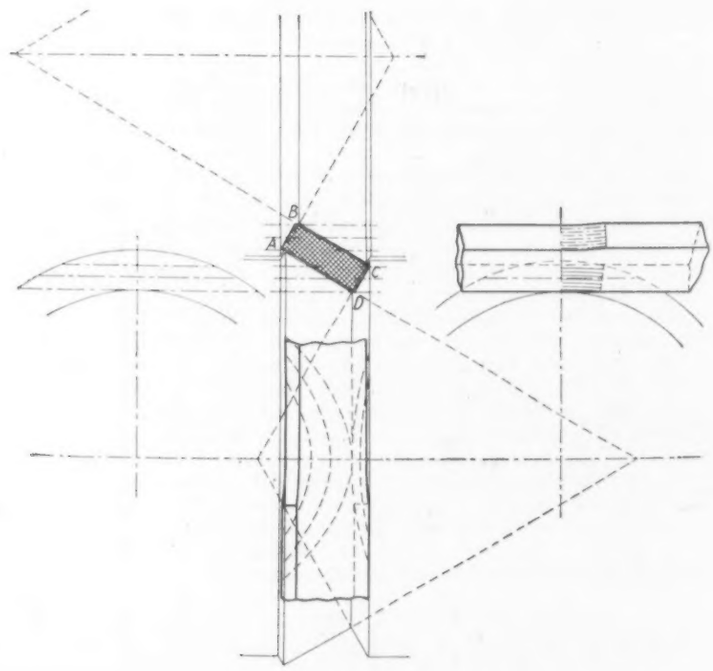


Fig. 2—Rolls with Indirect Draft or Pressure Between Both Rolls and the Section Going Through (Right)

*Chief engineer, Duisburg, Germany. This is an abstract of a translation from *Stahl und Eisen* of a report of the Rolling Mill Committee of the Verein deutscher Eisenhuettenleute; the translation was made by Richard Rimbach, metallurgist, Pittsburgh.

†THE IRON AGE, vol. 109 (1921), pages 1227-31.

the two grooves at the same time work toward two opposite directions by means of their side edges and thereby cause an upsetting of the stock in entering, that is, a reduction of the cross-section in a dfagonal direction. In addition to their manipulation in the closed diagonal pass, at the same time with the side reduction, a reduction in the direction vertical to the roll axis can be

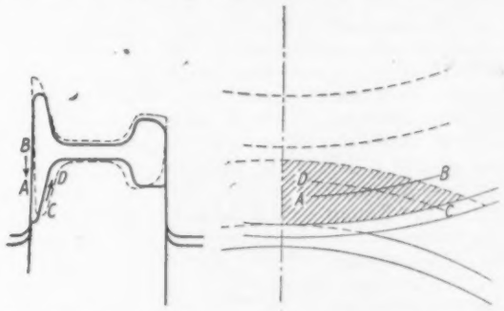


Fig. 3—Procedure in a Normal Rail Pass, Showing Lines of Forming Contact

exerted according to the chosen draft; and thereby the reduction of the profile takes place in two directions."

From this it follows that the oblique position system, according to which in America also the mine rails are manufactured from old rails, is a German invention.

Fig. 1 will serve for a better understanding of rolling with indirect draft, in which the reduction occurs in the cut-in pass in only one roll and in different directions. The upper roll, as such, does not enter into the question for the actual rolling process. It has the sole object to prevent the exit of the material from the pass, which could just as well be effected by another arrangement.

The method of working is explained by the following: The two effective surfaces *F* can be considered as belonging to two different cone-shaped rolls, whose prolonged axes of rotation intersect in a line, and turn in the same direction. The surfaces are sections of cone surfaces, whose points lie in the axis of rotation and whose angle at the apex is equal to 2α. Sections passed parallel to the roll axis at the points *A*, *B*, *C* through this cone give the conic sections (hyperbolas *AaA*, *BbB*, *CcC*). These hyperbolas give the direction which the displaced material must follow, theoretically, if the slip between the roll and the stock (spread in the direction of the inclination of the pass) is disregarded.

It appears expedient at this point to consider the rolling process in regard to a point *P* of the stock cross section. The cone surface *F* rotates about the roll axis and tries to move along a particle (for example, the point *P*) of the touching cross section in the same direction of rotation. If no other influences would affect the point *P* it would now continue to move in the arc *P*—*p*. But this is prevented by the force *K* and the friction between roll and stock. The movement of the point *P* will therefore proceed more in a perpendicular direction *P*—*c* (therefore in a hyperbolic path.)

Observation on a rod on which the rolling process has been stopped checks the correctness of this view, that the side work actually takes place on a hyperbolic curve. The shape of the hyperbola running parallel to the roll axis is dependent on the size of the angle α and on the distance of the cone section from the center axis.

If one resolves the indirect shaft into horizontal and vertical components, the influence of the horizontal component compared with that of the vertical increases, the more the angle α approaches a right angle. The more acute the angle is and the nearer the cone section lies to the axis, the more pointed is the hyperbola, while in the opposite case it assumes flatter shapes. The more pointed the hyperbolic shape, that is, the smaller the angle α, the more we approach the direct draft, and the larger can be the reduction.

Beginning with the hyperbolic shape, it must be considered that, for example, two equal hyperbolæ are possible in different angles α. In this case the distance of the cone section from the roll axis (roll diameter) influences the shape of the curve. Increasing the roll diameter with the same angle α increases the gripping properties of the oblique pass surface analogous to the conditions with direct draft. If the angle $\alpha = 0$, the cone section disappears and at the same time the indirect draft. If the angle $\alpha = 90$ deg., the cutting curves extend as straight parallel lines, which lie in the rolling direction. The pass surface determined by these lines would theoretically be in the position to exert indirect draft exclusively; however, such a case is practically impossible, as a gripping of the stock is excluded (the roll cuts). Between these two limiting cases lie the cases used in actual practice, in which indirect draft can be exerted by the side surfaces of the pass.

If α were larger than 90 deg., the pass surface would

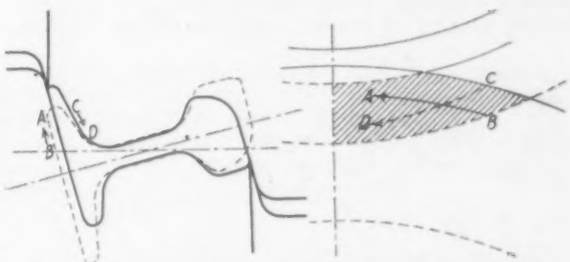


Fig. 4—Procedure in an Oblique Rail Pass, Showing Forming Operation

have the shape of a hollow cone and practically would not lie in a position to perform rolling work, moreover it is necessary, in this case, that the concave pass surface of the hollow cone be changed over to a convex surface. This can be done only on a second roll. Such a theoretical case is represented in Fig. 2. Due to the oblique position of the drawn pass the flat is lessened a slight amount in width (upset). Here also the corresponding cone surfaces are again effective.

When one compares the manner of working of two rolls exerting indirect draft (Fig. 1) with that represented in Fig. 2, we find that in case 2, in addition to the elongation, also a kind of distortion of the material must occur, due to the change of direction of the intersecting cone surfaces. The upper cone in sliding by the stock attempts to press the material out of the point *B* to the point *A*, while the lower cone moves the

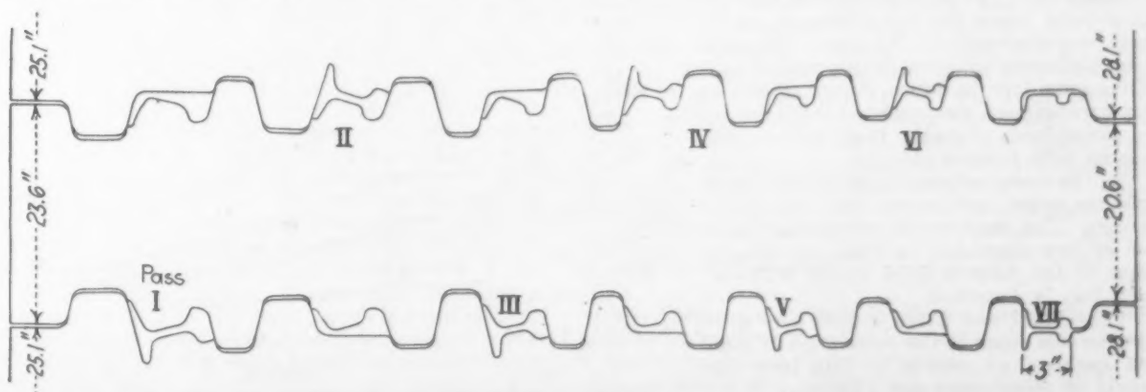


Fig. 5—Roll Profiles for 3-In. Rerolled Rails, Showing Their Gradual Formation in Seven Passes

material in the opposite direction from *D* toward *C*. This kind of side working is therefore the most effective.

The procedure can best be studied with the base of a rail (Figs. 3 and 4). Fig. 3 represents a normal rail pass, Fig. 4 an oblique pass for rerolling rails.

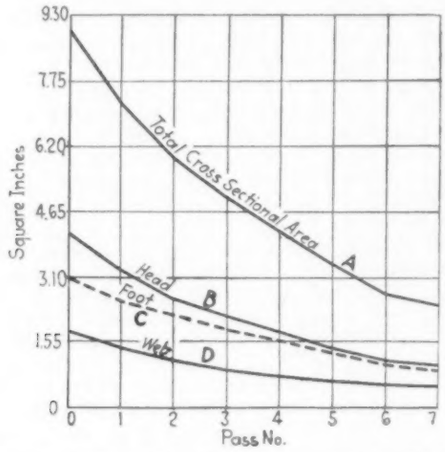


Fig. 6—Cross-Sectional Reduction, Pass by Pass, in Rerolling Rails to the 3-In. Height

The upper roll in Fig. 3 pulls the material in the base in the direction *A*, while the lower roll attempts to push the material in the direction *D*, therefore in the opposite direction. The relations are similar in Fig. 4. As the working of the rail with the oblique position, according to Dickmann, is done only by indirect draft, the above examples are put in to illustrate. Moreover, they might serve as a stimulation, as they often are found useful in cases which are difficult to explain.

The first rolls designed by Dickmann for the oblique position process were installed at the Dortmunder Union in a 20-in. three-high mill, which was already considered old at that time. The mill was really for the manufacture of tie plates, clamp plates and similar intermediate products. Rail ends were principally rerolled, as soon as a sufficient amount had accumulated. The process was carried out for several years, but later stopped, as the train was dismantled. At about the same time Rickmann supplied fully designed rolls of the same type to Bilbao, Spain. How long this arrangement was operated there can not be determined; probably they have experimented with it there also.

To the many articles in American periodicals are added now several new ones of late months. The most worthy of mention is the one in THE IRON AGE in 1921. In this the plant of the Sweet's Steel Co. in Williamsport, Pa., is described.

[The *Stahl und Eisen* article here gives considerable space to the description of plant and methods, as covered in THE IRON AGE article of three years ago.—Editor.]

In the following a practically executed design is given for rerolling on a 24.5-in. mill. Starting from the above viewpoint, at the Niederrhein plant, we developed designs for the manufacture of the most active profiles of 2.5, 2.75 and 3.2-in. mine rails. Stress was placed on the ability to reroll all the various old rails with a single design, in order to save extensive sorting, to get along with a smaller roll storage and avoid too frequent roll changes. The former is necessary, as one generally in Germany must buy the old rails from dealers, who usually deliver the old material unsorted, so that in a single load the most varied profiles are found. As a starting pass for several designs the full Goliath rail is taken. With continuous fabrication, however, it would pay to enlarge the roll storage and to have special rolls for the different starting passes.

Fig. 5 shows the roll of the 3.2-in. mine rails (according to the Krupp section book No. 12C). Here is found a cross section reduction of 72 per cent in seven passes. [An average of 16.7 per cent reduction per pass.] The average reduction in height up to the third last pass amounts to 0.53 in. For this object the passes are inclined from 14 to 18 deg. to the roll axis. Fig. 6 shows how the cross section reduction proceeds (Curve *A*). Curve *B* shows the cross section reduction of the head, *C* of the base and *D* of the web. We see here a regular course of the curves. As the reduction is small and the final cross section of the rail is quite strong, the rerolling presents no additional difficulties.

Fig. 7 shows the roll of the 2.5-in. mine rails (No. 7C in the Krupp section book) in nine passes. Here it must be considered that the steel, by the thin cross sections being touched by the roll and the air, cools more quickly. One easily commits the error of misjudging the influence of the temperature relations.

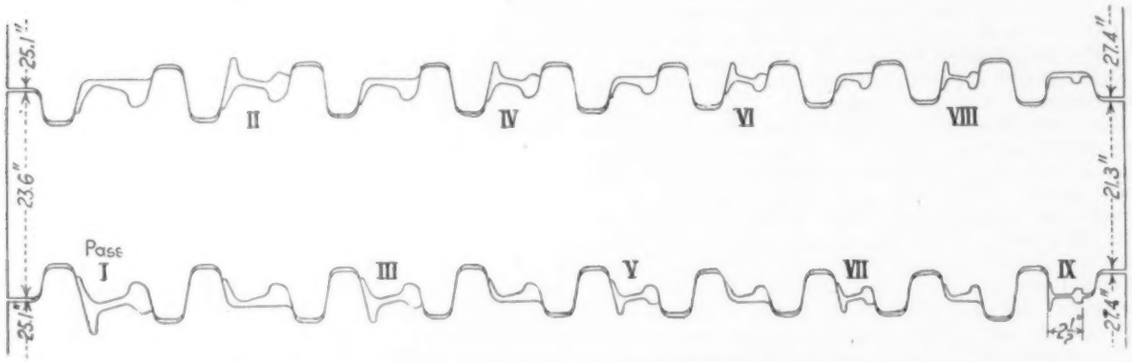


Fig. 7—Roll Profiles for 2½-In. Rerolled Rails, Showing Their Gradual Formation in Nine Passes

Here also as a beginning is taken a full rail 9 sq. in. section and 5.67 in. height. It is to be advised, though, with the 2.5-in. rail, to use the lightest possible old rail. In nine passes an 81 per cent cross section reduction takes place. [An average of 18.6 per cent reduction per pass.] The average reduction in height up to the third last pass (from there on an increase in height again takes place) amounts to 0.42 in. Here also the passes have an inclination of from 14 to 18 deg. to the roll axis.

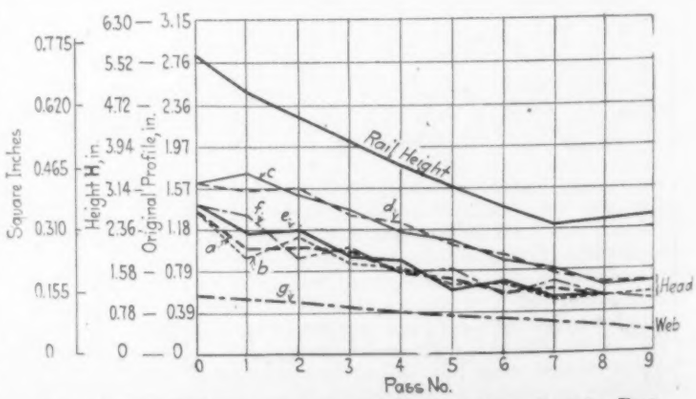


Fig. 8—Cross-Sectional and Rail Height Reduction, Pass by Pass, in Rerolling Rails to the 2½-In Height

Fig. 8 shows the course of the reduction curves of the profile height, of the web thickness and the head dimensions; Fig. 9 the course of the foot dimensions. Fig. 10 shows the cross sectional reductions. The greatest reduction from pass to pass amounts to 23.4 per cent; the mean reduction, 19.6 per cent. If smaller rails are to be rolled, the first pass is omitted.

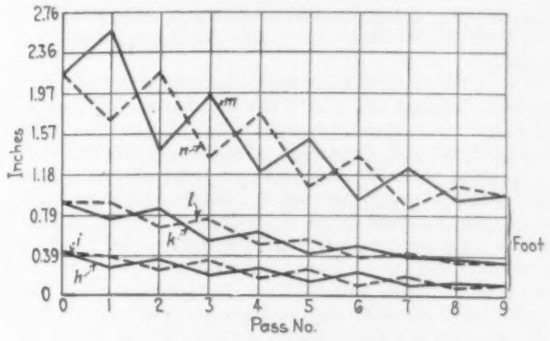


Fig. 9—Successive Foot Dimensions with the Roll Design Outlined in Fig. 7

As regards the tie-plate holes, these disappear almost altogether. After the fourth pass the hole already is pressed together into practically a closed slit by the pressure on all sides. The small slits, as they are approximately in the neutral fibers of the profile, have hardly any influence on the usefulness of the rail. Probably the results can lay claim to being second grade rails.

Comparisons of bending tests of mine rails with and without rolled out splice bolt holes show also that those with the rolled out splice bolt holes stand but little behind those without splice bolt holes, in regard to the bending strength. If one, therefore, is willing to take into the bargain these small defects in appearance, one could reroll all old rails with but little scrap. The old rail sections without splice bolt holes give, after rerolling, even though showing considerable wear, a product without objection.

The question of the economy of rerolling naturally depends upon the greater or lesser advantage, according to the price range, between old rails and mine rails. Ordinarily the following must be considered in an economic calculation:

1. The production possibility is smaller, due to the [slower speed of] rerolling of the lighter rail sections in comparison with roughing.

2. The scale loss is somewhat greater in rerolling, due to the larger surface subjected to the furnace flames and, during the rerolling, to the atmosphere.

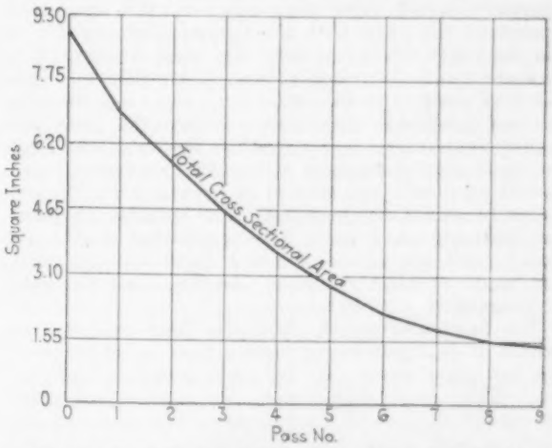


Fig. 10—Cross-Sectional Reduction of the Roll Design for 2½-In. Rails

3. In addition, the costs for the slight notching, with the subsequent breaking of the old rail under the eccentric press, must be considered.

The calculation will always show that, even in Germany, one should not disregard this process where a sufficient supply of old rails is available.

TO COMBAT MONOPOLY

Secretary Hoover Approves Amendment of the Webb-Pomerene Act

WASHINGTON, March 18.—Amendment of the Webb-Pomerene export act so as to permit American consumers to set up common purchasing agencies, for the purchase of raw materials controlled by foreign monopolies, is recommended in a letter from Secretary of Commerce Hoover to Senator Capper, of Kansas, which was made public yesterday.

Secretary Hoover presented his views on the question of combating foreign monopolies in raw materials essential to American industry at the request of Senator Capper, who has introduced a bill covering the question and which he contends is of particular importance to American farmers. Secretary Hoover says that investigations are being continued by the Department of Commerce regarding imported raw materials which are controlled by foreign combinations in restraint of price or distribution. He says there already is abundant material at hand to prove unquestionably that foreign monopolies or combinations are potentially or actually in control of price and distribution of nine products, one of which, Mr. Hoover says, is tin, which is controlled by a combination of British producers.

The most effective way of combating these foreign monopolies in the opinion of the Secretary is establishing of common purchasing agencies among American consumers under the Webb-Pomerene act. At present this act permits consolidation of exporters only.

Mr. Hoover told Senator Capper that the value of American imports of the nine foreign controlled products in 1923 exceeded $525,000,000 in value and that prices are undoubtedly much higher than would otherwise be the case.

While Mr. Hoover emphasized the suggested amendment of the Webb-Pomerene act as promising the most effective relief, he also declares that indirect security for American consumers can be obtained in some instances by the stimulation of production in other parts of the world free from foreign control and in other countries, by the encouragement of synthetic manufacture in the United States.

Pickands, Mather & Co. Will Operate More Iron Mines

The operation of five iron ore mines in the Lake Superior district that were taken over a year ago by the Youngstown Sheet & Tube Co. in its purchase of the Steel & Tube Co. of America, has been turned over to Pickands, Mather & Co., Cleveland. These have been added to the other Sheet & Tube mining properties operated by the Cleveland company. The mines involved include the Newport and the Palms-Anvil mines on the Gogebic range, the Kennedy and the Meacham mines on the Cuyuna range and the Isabella mine on the Marquette range. At the time the Youngstown company acquired the Steel & Tube company the Kennedy and Meacham mines were operated by the Rogers-Brown Ore Co., of which the Steel & Tube company held a majority of the stock. Up to March 1, when the transfer of the five mines took place, their operation had remained with the same organizations that had operated them before the properties of the Steel & Tube company were merged with the Youngstown Sheet & Tube Co. The annual output of the five mines is approximately 2,000,000 tons.

The Collins Co., Collinsville, Conn., manufacturer of edge tools, has reconstructed its Canton furnaces with a view to producing high-speed steel. A. C. Davidson, long associated with the crucible steel works at Sheffield, England, has had charge of the work.

Marked Improvement in Finances of Otis Steel Co., Cleveland

The Otis Steel Co., Cleveland, in its annual report for 1923, shows marked improvement of financial condition over the previous year. Profit before depreciation was $1,710,893, as compared with a loss in the preceding year of $427,659. Construction work under way evidently had very little effect on 1923 earnings, because the new manufacturing units, except the strip mill, were not placed in operation until 1924 and the strip mill was not started until last fall.

President G. Bartol stated in his report that all departments had been practically at full operation throughout the year, with the exception of the Riverside plate mill which had been idle since August, 1921, on account of unfavorable market conditions. This mill was started in December and since has been in full and profitable operation. During the year the largest construction program in the history of the company was carried through almost to completion. The hot-roll strip mill was started in September, 1923, and is now in profitable operation. The open-hearth plant and blooming mill have been completed since last January and are now producing. Improvements have been made to blast furnaces, and the sheet bar mill is approaching completion.

The new open-hearth plant has four 120-ton furnaces, a 40-in. blooming mill and a 24-in. sheet bar mill. This new plant has an annual ingot capacity of 225,000 tons. The report states that the open-hearth plant can readily be expanded to 12 or 14 furnaces and the blooming mill is capable of handling this increased capacity. The strip mill plant is equipped with a 20-in. hot strip mill and 20-in. cold rolls. With the extensions to its finishing department the Riverside plant now has an annual capacity of 144,000 tons of plates, 84,000 tons of blue annealed plates, 54,000 tons of sheets and 120,000 tons of strip steel. In addition, the Lakeside works has an annual capacity of 84,000 tons of plates and 30,000 tons of castings.

Comparative income accounts for 1922 and 1923 are as follows:

	Year Ending Dec. 31, 1923	Year Ending Dec. 31, 1922
Operating profit	$2,110,756.13	$82,056.52
Less depreciation	350,000.00	.....
	$1,760,756.13	$82,056.52
Other income	114,753.28	100 399.34
	$1,875,509.41	$182,455.86
Other charges	514,616.34	610,115.05
Profit	$1,360,893.07	$427,659.19*
P. & L. surplus, Jan. 1, 1923	$1,173,439.79	$1,531,168.27
Unused reserves for inventories, etc., returned to surplus	.....	230,491.96
	$1,173,439.79	$1,761,660.23
Profit as above	1,360,893.07	427,659.19*
	$2,534,332.86	$1,334,001.04
Adjustments applicable to prior period—added	342,424.17	160,561.25†
P. & L. surplus Dec. 31, 1923	$2,876,757.03	$1,173,439.79

*Loss.
†Deducted.

Annual Report of Central Steel Co. Shows Satisfactory Earnings

The Central Steel Co., Massillon, Ohio, in its annual report for 1923, shows net earnings of $2,006,953. Charging off of $720,000 for depreciation brings the total reserve up to $4,243,613. In addition to this charge the company absorbed in operating costs during the year $1,127,399 for repairs, an increase of $236,462 over the preceding year. Total outlay for repairs, depreciation and amortization amounted to $2,096,164. During the year the plant equipment account was enlarged $519,567.

Reference is made to the annual report of R. E. Bebb, chairman of directors, to the sale of 80,000 shares of common stock to Cleveland interests, this referring to the sale of stock to the Cleveland-Cliffs Iron Co. In this connection a long-time contract was made for ore, assuring an ample supply. The proceeds of this stock sale are now being carried as a loan at 6 per cent and will be used in the erection of a blast furnace and by-product coke ovens, plans for which now are being prepared. A site for these extensions covering 178 acres has been purchased.

During the year the company retired $250,000 in bonds, leaving a bonded indebtedness of $4,750,000. A portion of the annual report of Chairman Bebb is as follows:

"As a whole 1923 was a very satisfactory year for this company. During the year 1923 we showed an average operation of 7.1 open-hearth furnaces as compared with 6.6 in 1922, with a production of ingots of 322,726 tons, as compared with 334,695 tons for 1923. Our new bar mills, to which very favorable reference was made in our last year's report, show a production in 1923 of 227,887 tons as compared with 176,488 tons in 1922, an increase of 51,399 tons. The sheet mills showed a production of 60,842 tons for 1923 as compared with 50,381 tons for 1922, showing an increase of 10,461 tons. The National strip division showed a production of 79,795 tons, as compared with 59,507 tons for 1922, an increase of 20,288 tons.

"During the year we showed very satisfactory earnings in the Central Steel division. In the sheet mill division, while we showed operating earnings, it was not a satisfactory year due largely to industrial conditions. In this plant we produce only high grade automobile sheets and due to changes in the requirements and specifications by the users of this product, it was necessary, some two or three times, to change entirely our methods and process of manufacture, each in turn entailing considerable loss. We are in this plant today producing a finished product that ranks equal to that of any of our competitors, and we are expecting this division to show satisfactory earnings in 1924. The National division has shown a very gratifying earning capacity due largely to improved efficiencies and methods which have greatly reduced the cost of production per ton with increased tonnage."

Increase in Scope of New York Power Show

An increase to the scope of the National Exposition of Power and Mechanical Engineering—the third to be held in the Grand Central Palace Dec. 1 through 6, 1924—is shown by the addition to the advisory committee of the presidents of the American Society of Heating and Ventilating Engineers and the American Society of Refrigerating Engineers. Homer Addams, New York, is president of the heating engineers and George A. Horne, New York, is president of the refrigerating engineers.

The mechanical engineers' delegation consists of the president, Fred R. Low, the chairman of the professional divisions committee, James Partington, the chairman of the power division, Nevin E. Funk, and the secretary, Calvin W. Rice. The National Electric Light Association is represented by the president, Walter H. Johnson, and the National Association of Stationary Engineers by Past-President Fred Felderman. The remainder of the advisory committee, who hold over from year to year, are I. E. Moultrop, chairman, Edison Electric Illuminating Co., Boston, W. L. Abbott, chief operating engineer Commonwealth Edison Co., Chicago, N. A. Carle, vice-president and general manager of the Public Service Production Co., C. F. Hirshfeld, chief of research department, Detroit Edison Co., O. P. Hood, chief mechanical engineer U. S. Bureau of Mines, E. B. Katte, chief engineer electric traction, New York Central Railroad, John H. Lawrence, Thomas E. Murray, Inc., New York, and Fred W. Payne and Charles F. Roth, managers of the exposition.

The Swiss Industries Fair will be held this year in Basle, Switzerland, from May 17 to 27. Buyers' cards and any further information will be given, upon request, at the Swiss Legation in Washington, or any Swiss consulate in the United States.

Manufacture of Condenser Tubes*

How Non-Ferrous Castings of Hollow Cylinders Are Transformed Into Tubes—Composition and Heat Treatment

FEW problems relating to the operation of steam power plants, both marine and stationary, involve greater perplexities than those surrounding the endurance of the tubes employed in surface condensers where salt or contaminated cooling water is used. The troubles incident thereto, however, are not new as, prior to the large scale use of surface condensers in stationary practice due to the increasing demands for electric current, the difficulties encountered had for many years been a source of annoyance to marine engineers.

Failures experienced are of two kinds. One is due to spontaneous longitudinal splitting of the tube, which is an exhibition of the phenomenon known as season

Defective Shell Casting Showing Unskillful Workmanship

cracking. The other is caused by the corrosive attack of the cooling water or of substances carried by it.

Admiralty Mixture

Originally most condenser tubes were made of a mixture of about 70 per cent of copper and 30 per cent of zinc, this composition being dictated by considerations affecting the manufacture rather than the performance of the tubes. Experience having demonstrated that the presence of a small amount of tin retarded the corrosive effects of sea water, some experiments were made in which 1 per cent of tin was substituted for 1 per cent of zinc, with the result that superior resistance to corrosion was obtained. This specification was originally adopted by the British Admiralty since which time the term "Admiralty mixture" or metal has been employed to designate it.

For this a complete and sufficient remedy for season cracking is a moderate degree of annealing. It was originally the practice to furnish condenser tubes hard, i.e., without any final heat treatment. No way is known to the art by which tubes so made can be positively assured against this trouble. On the writer's recommendation, the Bureau of Steam Engineering of the Navy Department, somewhat over 20 years ago, adopted specifications requiring that tubes be annealed after the final drawing operation. This practice has since become standard in this country, although English manufacturers still continue to omit a final annealing.

The Admiralty mixture is not short and can consequently not be made into tubes by the customary method of hot piercing a solid billet or blank. Instead the usual practice is to make the initial casting in the shape of a hollow cylinder. To form this, appropriate amounts of copper, zinc and tin, together with a suitable quantity of scrap, are brought to a molten state and then poured into a vertically disposed cylindrical mold of cast iron in the center of which a cylindrical sand core is supported.

Only the highest grades of material obtainable are employed. While the impurities carried by slightly lower grades have never been proved to have an effect on service endurance, they do affect the ductility of the material and cause a resulting increase in its cost of manufacture, entirely out of proportion to any saving in initial cost.

Lead and iron are considered deleterious impurities. When in excess, both hamper the operations of the tube maker, and the latter in particular is believed to assist the attack of corrosive agencies. The effect of such other impurities as normally exist in well-made brass has not been shown to be of material consequence.

Objection is sometimes made to the use of scrap, but if it is understood that the term scrap is not synonymous with junk and that an inferior mixture results if too large a proportion of elemental metals be employed, no grounds for such objection exist.

Casting, Hot Billet Piercing

The resulting casting is about 4 in. in outside diameter by ⅝ in. thick by 50 in. long and represents the highest expression of the art of casting non-ferrous metals. Until quite recent years the metal was melted in crucibles holding about 200 lb., but the electric furnace of the induction type produces a far superior casting and is therefore rapidly supplanting the crucible for this purpose. When it is realized that a casting of the above mentioned dimensions, having a cross sectional area of about 7 sq. in., is by a succession of cold drawing operations, as will be more specifically described hereafter, reduced to a tube having a cross sectional area of about 0.15 sq. in., involving an extension of each element of the original casting of 40 to 50 times, and that the resulting product must be free from visible defects of any character, the perfection of both structure and properties, which must be possessed by it, will be fully appreciated.

Longitudinal and Cross Section of an Acceptable Shell Casting

After the casting is withdrawn from the mold, it is thoroughly cleaned by a sand blast and then annealed at a temperature of 750 deg. C. The casting, or shell, as it is usually designated, is then submitted to the first drawing operation. This is performed by inserting in the bore of the shell a hardened steel arbor of cylindrical form slightly smaller in diameter than the inside diameter of the shell. By suitable mechanism the shell and arbor are together forced through a

*From an address on "Condenser Tubes," delivered before a recent session of the Metropolitan Section of the American Society of Mechanical Engineers, by William R. Webster, vice-president, Bridgeport Brass Co., Bridgeport, Conn.

circular die, some ¼ in. smaller in diameter than the outside diameter of the shell. As a result of this operation the shell is elongated some 35 per cent and its cross sectional area correspondingly reduced.

The severity of the reduction is such that metal of an inferior quality, either due to unskillful casting or deleterious impurities, is unable to withstand it and breakage inevitably results. As will be later shown this operation reduces the ductility of the metal so that it must be annealed to restore this property. It is next given two successive arbor draws, each followed by an annealing operation, smaller dies and arbors being employed in each case.

From now on alternate drawing and annealing operations follow each other until the required finished diameter and thickness are reached, excepting that instead of employing an arbor which is pushed through the die with the tube, a plug or triblet is held in a stationary position within the die and the tube is drawn through the former and over the latter. As the drawing operations continue, the tube becomes too long for convenient handling, so that it is cut into appropriate lengths from time to time. Departure from the cast state increases the normal ductility of the metal somewhat so that later reductions are correspondingly greater than the initial ones.

The Heat Treatment

The annealing operation to which the tube is subjected is an important one since the ductility of the metal is within limits a function of the temperature to which it is heated in the process. Since annealing is employed for the purpose of removing the hardening and embrittlement due to drawing, it is manifest that it should be so governed as to produce maximum ductility. Careful pyrometric control is therefore essential to good practice in this respect.

One of the causes of tube failure is due to a phenomenon known as season cracking which, it is said, can be prevented by annealing after the final drawing operation. By properly governing the drawing operations the tendency to season crack can be controlled to some degree, but it cannot by this means alone be eliminated with certainty.

Since a condenser tube when fully annealed is so soft as to be readily distorted by treatment incident to handling and installation, it is customary practice to modify the final anneal to a degree that will, while removing all liability to season cracking, still leave the tube hard enough to withstand handling. As considerable controversy has attached to this matter, a discussion of the facts involved, which are well established in the literature of the subject, may be of interest.

Changes in Structure

When a tube has been annealed prior to a drawing operation its structure consists of a mass of more or less regular crystals, the average dimensions of which are proportionate to the temperature to which it has been subjected in the annealing operation. When the tube is drawn, these crystals elongate axially proportionate to the elongation of the tube caused thereby. If the tube be now subjected to a successively increasing temperature such as occurs in an annealing furnace, a point is reached where the crystals begin to break up. This action continues with a rise of temperature until the original strained structure has disappeared and the mass consists of fine crystals free from indications of strain. As the temperature increases the crystals increase in size progressively until the melting point is approached.

In order however that this breaking up take place, the amount of reduction effected by the drawing operation must exceed a certain minimum. On the other hand, should the temperature of the anneal prior to the draw be high enough to produce relatively large crystals, the average size to which the crystals will break up in the subsequent anneal will be larger at the time increase in size begins than is the case when the prior anneal takes place at a lower temperature. In order therefore to produce that character of structure to which importance is attached by some, which is usually designated as "fine and regular," it is customary to employ heavy reductions and low annealing temperatures in connection with the last two or three drawing operations.

The annealing and drawing operations are basic ones. Several others incident to them are essential to the production of a finished tube, but need not be discussed at this time.

The metallurgical microscope is an extremely useful instrument for determining whether the annealing operations have been so conducted as to prevent season cracking on the one hand and undue pliability on the other, but its value as a means of predicting service endurance has not been established by any well attested record of experience.

[In a later issue, the portion of this address dealing with corrosion and season cracking will be published.—Editors.]

Analyzing Metals with the Spectroscope

Increasing numbers of industries engaged in the manufacture of metal products are finding a valuable aid in the method of spectral analysis of metals which they use, and which has been developed to its present state by the spectroscopy section of the Bureau of Standards. According to W. F. Meggers, head of this section, this system offers a more convenient and rapid means of detecting impurities in metals than chemical methods. Two big New England firms, one engaged in brass and bronze manufactures and the other in silver, are making constant use of a spectrograph, a device which makes this detection of various chemical elements a simple procedure.

It was while the Bureau of Standards was engaged in researches in this science that a problem came up. A steamship had been lost by a boiler explosion. In such boilers there had been placed a safety plug which was supposed to melt at certain temperatures forming one of the conditions preceding such an explosive point. The "safety plug" had apparently failed. The Bureau sought the cause.

The spectrograph revealed that plugs which were supposed to be of pure tin contained a trace of lead, zinc, and other metals in some cases. Pure tin melts at a temperature of 232 deg., C. The presence of lead or zinc or other impurities caused the formation of a compound which required a much higher temperature for melting.

Not long ago the spectrographic method revealed its accuracy in "checking up" the Bureau of Standards itself. Standard samples of vanadium steel had been prepared and sent to various points. Word began to come back that these "standards" showed traces of tin. At once an exhaustive check-up was begun. The operations were carried on to the point of boiling down some of the chemical reagents used in preparation of the samples. A tiny scrap of residue was found, not larger than the head of a pin, too small for chemical analysis. Use of the spectrograph disclosed that there were 11 chemical elements in this tiny speck, and that the most prominent was tin.

The regional meeting of the National Machine Tool Builders' Association, held at Cincinnati, March 3, was one of the best attended in the history of the association. President R. E. Flanders attended the meeting. Discussion resolved itself into development of means whereby obsolete machine tools now in use can be replaced with modern equipment. The art of salesmanship was also discussed at the meeting, it being felt that improvement is necessary in this line to keep up with the strides made in design of tools during the past few years.

Protecting Cases Against Pilfering

A device to prevent pilfering of cases and other shipping containers, protecting them from the inside, is being marketed by the Goodwin Antipilferage Automatic Lock Corporation, Woolworth Building, New York.

The device, which is called the Gallco lock, is made up of a simple lock and bolt. The lock is fastened to the inside of the case and the bolt is passed through the cover into the lock, which holds with a tight grip. It is easily attached. It is claimed that equipped with the lock, the cover of the case cannot be raised, or any of the intermediate boards shifted or slipped. It is intended that only by entirely wrecking the case can the contents be removed in a hurry. The device is said to increase the strength and rigidity of the container, permitting in many instances the use of lighter cases. Lower insurance rates are also said to be available.

Portland Cement Production

February production of Portland cement is reported by the United States Geological Survey to have been 8,588,000 bbl., compared with 8,788,000 bbl. in January, and with 8,210,000 bbl. in February, 1923. Both months which have elapsed in 1924 have shown a considerably higher production than the corresponding months of 1923. Both, however, have shown a considerably lower record of shipments than in 1923, resulting in an accumulation of stocks at the mills aggregating at the end of February 16,811,000 bbl., compared with 13,596,000 bbl. at the end of February, 1923.

Surplus Labor in Pennsylvania

HARRISBURG, March 17.—Despite a noticeable improvement in demand for skilled and common labor in Pennsylvania's industries, there was still a surplus of both classes on March 1, the semi-monthly report of the Department of Labor and Industry showed. Optimism prevailed throughout the State that the spring with better weather will see a general opening of construction work and a consequent increase in the demand for labor.

Office workers, the report showed, were having a rather hard time getting places. There were many good men in all branches of this work out of employment.

Cork Foundation Plates

Unusual durability and elasticity are claimed for cork foundation plates recently placed on the market by the Korfund Co., 42 Broadway, New York. The plates are for use in insulating surrounding structures from vibration set up by engines, compressors, machine tools and other machinery.

This equipment, which has been marketed in Europe heretofore, is made up of strips of natural cork, specially treated, and bound together by an iron framework reinforced by internal iron struts. The arrangement of the cork strips is a feature and freedom from decay and deformation are emphasized. The plates are available in sizes and shapes to suit requirements. They are placed side by side on a flat surface of the sub-base and the foundation is built on top of it.

Changes Name of Die Heads

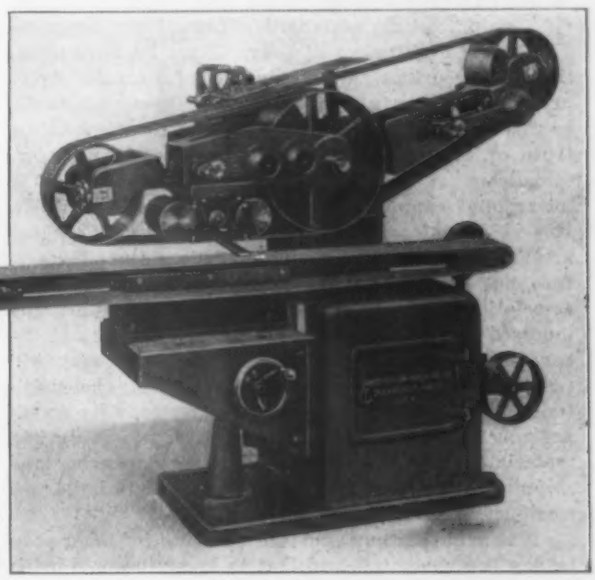
"Land-Matic" is the new name given to the line automatic die heads of the Landis Machine Co., Waynesboro, Pa., which are intended for use on turret lathes and hand operated screw machines.

In this design the chasers are supported on the face of the head to permit of easy access. The head is opened automatically by retarding the forward motion of the carriage, and is closed by hand. It is locked by the engagement of two hardened cylindrical lock pins in hardened bushings. The head is adjusted to size by means of an adjusting screw which engages the head body. It is graduated for all sizes of bolts, both right and left-hand and right-hand pipe, within its range. The chaser holders and trunnions on the two smallest sizes are integral and may be conveniently removed. On the three largest sizes the chaser holders and trunnions are separate. The heads are available with shanks to meet individual requirements.

Finishing Machine for Flat Work

An abrasive finishing machine, designated as the type F, and intended for flat work has been added to the line of the Production Machine Co., Greenfield, Mass. The capacity of the machine is for pieces from 1/16 to 4 in. thick, and 5½ to 18 in. long.

In general construction the new machine is the same as the company's vertical type A, but it is set horizontal for flat work exclusively. A conveyor belt, mounted on the adjustable knee, carries the parts to the polishing position, the machine then finishing or polishing them automatically. The operator merely loads the machine and the finished pieces drop off the end of the conveyor into a box or chute. The arrangement of the abrasive belt and pulleys may be noted from the illustration. Two belts are employed, a leather belt being



Abrasive Finishing Machine for Flat Work Ranging from ¼ to 4 In. Thick and 5½ to 18 In. Long

provided to give backing at the polishing position for the abrasive belt.

The conveyor belt is driven at 8 ft. per min. Work shorter than 6 in. may be laid on wooden blocks attached to the conveyor belt. It is unnecessary to clamp the work to the blocks, but pins are provided for the work to thrust against. For work longer than 6 in. the blocks are not attached to the conveyor belt, the latter having cleats against which the blocks may thrust. The table upon which the conveyor unit is attached is adjustable for different thicknesses of work. Hand fixtures may be used for polishing the flat surfaces of parts which cannot be handled to good advantage by the conveyor belt.

To operate the machine 10 hp. is required. Lubrication is by compression grease cups, and main bearings and idler pulleys are equipped with floating bronze bushings. The leather cushion belt is 109 in. long and 6 in. wide and the abrasive belt is 14 in. long by 6 in. wide. The floor space occupied by the machine is 45 x 104 in. The height is 62 in.

The Youngstown Steel Car Co., Niles, Ohio, has received an order from the Pennsylvania Railroad for 4000 patented steel freight car doors. The doors are made of new steel and will require a considerable tonnage of light plates.

Why Not Simplification in Steel Sheets?

Unnecessary Number of Gages, Styles of Finish and Sizes an Economic Waste—Call on Sheet Users for Standardization

BY "MILLMAN"

THE author, until recently actively engaged in the sheet steel business, intimates that the sheet makers would welcome any concerted move to bring the needed reduction in the variety of sheets—in thickness, finish, width and length. By way of suggestion the call is made specifically on the makers of stoves, kitchen ware and automobiles. In THE IRON AGE *of Feb. 14 the author discussed the causes of variations from gages ordered and the reasons for current mill practices.*

PERHAPS few of us realize that the public itself is unconsciously contributing toward the comparatively high prices of today, if not by demanding, then by encouraging the production of a complexity of articles in a variety of sizes. Some of these could easily be dispensed with. Those who may be skeptical of the truth of this statement need only to read of the accomplishments of the Department of Commerce in the interests of simplification. Through the efforts of Mr. Hoover and his able associates many sizes or various articles have already been eliminated, and yet the surface has hardly been scratched. Some of the trade association, both wholesale and retail, have heartily indorsed the idea. None know better than they of the benefits that will accrue and the economy that will result from standardizing and simplifying the multitude of articles that we use and consume.. By standardizing shapes and eliminating sizes, less labor and material will be required in producing, packing and shipping, and less money will be invested in buildings, machinery and stocks.

It is said that our standard of living is higher than in any other country, and that to lower it would bring discontent and perhaps disaster. But certainly no one will object to paying less for the necessities and comforts of life if it can be accomplished by simply restricting our tastes and reducing our extravagances.

Competition has increased to such an extent and American ingenuity is so great that industries, in their scramble for business, are using every conceivable means for opening the public's purse. If the public realized that it really controls the situation, and could, if it would, establish standards for every article, refusing to buy those that are not actually needed, there would be an immediate and marked change in production. The public is not organized, either economically or commercially, and is therefore too unwieldy to take concerted action either for or against a measure of this kind. Perhaps each of us realizes that a greater variety of articles are offered us than we really need. We wonder why this is so but conclude that we can do nothing about it and that it is none of our business anyway.

Many of us engaged in industry are doing all we can to increase our lines. We assist in adding a new product, a new style or another size. We either fail to realize that this adds to the cost of production and distribution and therefore necessitates a higher price, or, realizing it, conclude that it is justified if the public can be induced to pay the increase. We overlook the fact that we are a part of the buying public and that in doing this we are contributing toward the increase of our individual costs.

Since we readers are especially interested in iron and steel and the multitude of articles fashioned from them let us consider economies that would accrue to manufacturers and consumers of sheets by eliminating some of the grades, finishes and sizes in which sheets are made.

Enormous Number of Grades, Finishes and Sizes

Sheets are made in every gage number from No. 10 to No. 30 inclusive, exclusive of plates and tin mill products, and there are 21 different gages, or weights and thicknesses in which they are rolled. Sheets are also made in 125 to 150 different grades and finishes, including the several weights of galvanized and terne coatings. The dimensions of the sheets in some finishes run all the way in rolling sizes from about 20 in. to 48 in. wide, and from about 60 in. to 144 in. long (some are made wider and longer). On the basis of the difference in size of ½ in. in width and 1 in. in length (and many are ordered in smaller fractions) there are fully 75,000 possible sizes, including gages, in which sheets can be and are sometimes made. Multiply these 75,000 sizes by the number of grades and finishes in which they may be used and we find that sheet manufacturers are required to make a vast multitude of sizes of various gages, grades and finishes. Comparatively few of these grades, finishes and sizes are considered standard and made for stock, or carried by jobbers in stock. Not more than a few hundred are thus made and carried. The remainder are made only as ordered. It is, perhaps, safe to say that sheet manufacturers supply their product in a greater number of grades, finishes and sizes than does any other industry.

Those familiar with the sheet manufacturing process know very well that it is more costly to make special grades and finishes and odd sizes than to make standard products and sizes. Special grades and finishes require special material (more costly), special attention and processing and special machinery.

Special sizes are frequently made in smaller quantities than are regular sizes, and require that special weights of bars be made. This, requiring that the bar mills be adjusted for each foot-weight of bar, slows down production. It is not always possible to make the exact quantity of bars that may be needed for a given size. Bars must first be rolled in long pieces from ingots weighing several tons each and then cut to the lengths required. As each long bar can be

rolled to one foot weight only it may, when cut up, result in there being more short bars than are needed. These extra bars must be rehandled and stocked. Sometimes they can never be used, but must be scrapped. While in stock they increase the cost by adding to the investment. When scrapped they further increase the cost through loss of material. On the other hand, when standard size sheets are to be rolled all bars made can be used because usually no great difficulty need be anticipated in disposing of the finished stock.

Rolling Obstacles in Producing Unusual Sizes

Sheet mills are built for quantity production and conditions or orders that reduce production increase cost. The cost of handling, assembling, dispatching and recording is, to a large extent, in proportion to the number of grades, finishes and sizes produced. Special facilities must be provided, more machinery, more space and more supervision. Nearly every grade and finish requires a more or less rigid inspection. The amount of material classed as below standard and rejected runs from 2 to 25 per cent of the tonnage rolled. The percentage of rejections of a given grade and finish is usually lowest in small sizes and highest in large sizes. Sheets in both very small and very large sizes are hardest to dispose of. They are also more costly to make as they can not be rolled nor put through any subsequent process as rapidly in tonnage as can sheets of medium sizes.

Rejected sheets, since they are worth less than prime sheets, are frequently sold at a loss. The loss sustained must be charged to the cost of prime sheets. It is therefore advisable for the manufacturers to realize as high a price as possible and to do this it is necessary to keep the different grades, finishes and sizes separate. This requires a large storage place and much rehandling.

In many instances purchasers of sheets could use the defective ones and by so doing would get their supply quicker and cheaper as the mill would not be required to store and sell them, nor would there be a shortage of primes to remake. This would greatly simplify a very perplexing problem. It would lower costs and this saving could be passed on to the purchaser.

Why Not Eliminate Many Odd Gages?

Further economies would result if some of the gages were also eliminated, as it would reduce manufacturing expense and investment in stocks. There is a difference of only 11 per cent in weight between No. 10 and No. 11 gage, and 12 per cent in weight between No. 29 and No. 30 gage. Nearly half of this difference may be required by mill variation, 5 per cent being allowed for No. 16 gage and heavier and 2½ per cent for No. 17 gage and lighter.

Two items may be rolled, one of No. 10 gage and one of No. 11 gage. The No. 10 gage item may finish 5 per cent light and the No. 11 gage item may finish 5 per cent heavy. Each is a good delivery and will be used for the purpose ordered. In neither case would it make any difference had either No. 10 or No. 11 gage been ordered. Would it not be reasonable to assume that many odd gages could be eliminated? In many other building products the differences in thicknesses are greater than the difference between gages of sheets. Ordering one gage heavier might or might not increase the cost of an article but it would make it more durable.

Relief Could Come from Stove Industry

The stove industry uses a great many different sizes and gages of sheets, probably as many as any other industry. It also uses several grades and finishes. Nearly every type of stove will so nearly match in dimensions those offered in competition that the slight difference can certainly be of no special advantage. What difference does it make to a woman whether one oven is slightly deeper, longer or wider than another? She does not measure it and probably does not know it. Why could not the average family select from two sizes, or three at most?

If the members of the stove associations could agree on standard sizes and dimensions of stoves, and on standard sizes of the necessary sheets, many of these sheets could and would be made for stock in large quantities and they could be shipped promptly upon order. This might reduce the stove manufacturer's investment in stock by a greater amount than would be the increased investment of the sheet mill. A stove order for 15 to 30 different gages and sizes of sheets is not uncommon. Perhaps the individual stove companies could re-design their lines and styles to enable them to use sheets in fewer sizes. The sheet mills are frequently required to re-shear sheets for stove purposes from larger rolling sizes, and for this they charge an extra price. Fewer and larger sizes would necessitate a smaller stock, the price would be lower and the sheets would be interchangeable to a greater degree.

A complete assortment of kitchen ware consists of dozens of vessels of every conceivable size and shape, yet comparatively few of them are good sellers. Many of the utensils found in private kitchens are seldom used. They were purchased, not because they were really needed, but because they were on display. Perhaps they attracted the eye or were brought to the attention by the salesman. Some styles, sizes and lines do not sell readily but must be pushed, and yet instead of realizing that they are to a large degree superfluous, pressure is used to sell them, and thus is foisted on the public a useless expense and a waste of material.

An article may be supplied in two or more designs. One of these may be sufficient and the others unnecessary. Different designs require that material be cut and formed differently. Every separate operation is an expense. It requires labor and material. Every design that can be eliminated, every process that can be avoided reduces expense and saves money for the public.

Inordinate Demands of Automobile Industry

The automobile industry consumes more sheets, perhaps, than any other. There is really very little difference in the dimensions of many cars of approximately the same weight and carrying capacity, and yet literally thousands of different sizes and finishes of sheets are required in their construction. How many persons select a car because of the fenders are a half-inch wider or longer or because the body is an inch shorter or lower than those of some other car? It is true that appearance has its advantage and that symmetry pleases the eye, yet these can be accomplished with fewer sizes of sheets if processes and parts are standardized. Parts such as fenders, hoods, radiators and bodies may be built in several factories for the same make of car, yet each, in many instances, order sheets of different kinds and sizes. If one factory is building not so well and at greater expense than another, then the sheet mills, the car builders and the public are the losers.

The majority of sheets made in so-called standard sizes are made in large quantities and thereby cheaper Many of these sheets are supplied for building purposes, yet buildings are often designed apparently with little thought to the standard sizes of materials or to such sizes as can be obtained from stock. When lumber in other than standard sizes is required, it is usually cut on the job from standard sizes to the proper sizes. The builder pays for this loss. When windows, doors

and their frames are required in special sizes they are made to order and cost more.

Cure May Lie in More Special Prices

Custom has decreed that sheets shall be furnished to all in a multitude of special sizes for a standard size price. Perhaps one sure way to start the ball rolling toward the goal of simplification would be to make an extra charge for all special sizes. Certainly there seems to be no good reason why manufacturers through thoughtlessness, ignorance or indifference should place a burden on the shoulders of the public by inviting, enticing and coercing it to pay for squandered material and wasted labor. Material not needed is squandered; labor not needed is wasted.

It is well known that a vast sum of money is invested throughout the country in buildings, machinery and stocks. It would be impossible to estimate, even approximately, the amount invested in inactive assets, and it may therefore be said without fear of contradiction that it is many millions of dollars. These millions are drawing interest and the industries, the jobbers and the retailers are paying it. In order to pay it they must first make it and they do this by adding it when naming the price that the public must pay for the articles it buys. All of this is the result of an effort on the part of manufacturers and jobbers to market increasing quantities of their wares, and they are encouraged to do this by the variety of tastes and extravagances of the public.

It is time to call a halt and to take careful stock of the things we need. Eliminate the shoddy, the gaudy and the unnecessary items. Be content with less variety, demand greater utility and thus help ourselves to save our money. Assist our Department of Commerce by word and act in its well directed effort to eliminate waste and reduce costs through simplification of our products. The products and manufacturing methods of many industries can be simplified, and when done the saving collectively will be very great.

FOULING OF STEELS

Stainless and Carbon Steels Compared for Use in Ships' Bottoms

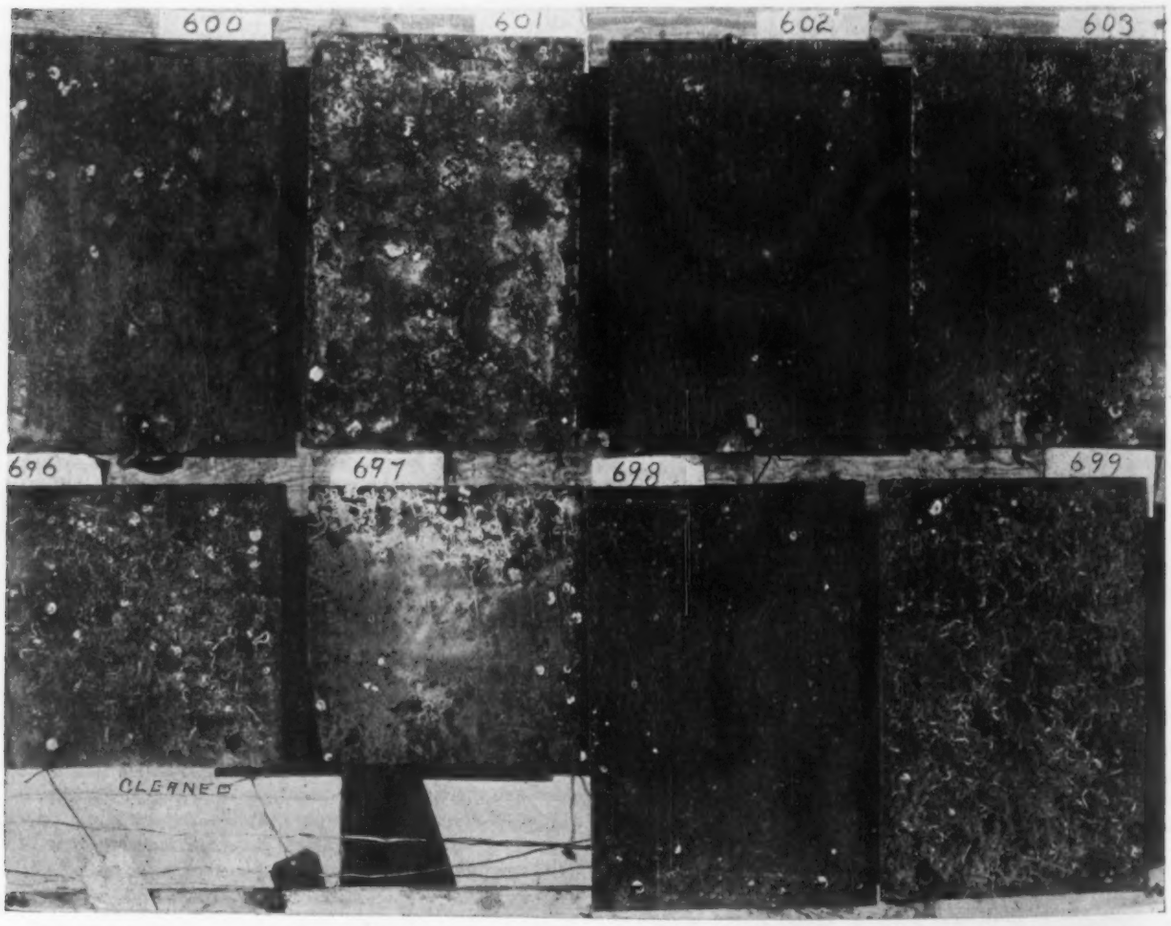
BY HENRY WILLIAMS*

IN connection with an investigation of measures to be taken to prevent attachment of fouling growths of marine organisms to the bottoms of ships, it was suggested that the so-called stainless or corrosion-resisting chromium steels might prove of advantage for this purpose. It was reported that no fouling had formed on the diaphragms of certain sound detecting devices fitted on the bottoms of ships, and that this was attributed to the fact that the diaphragms were made of stainless steel.

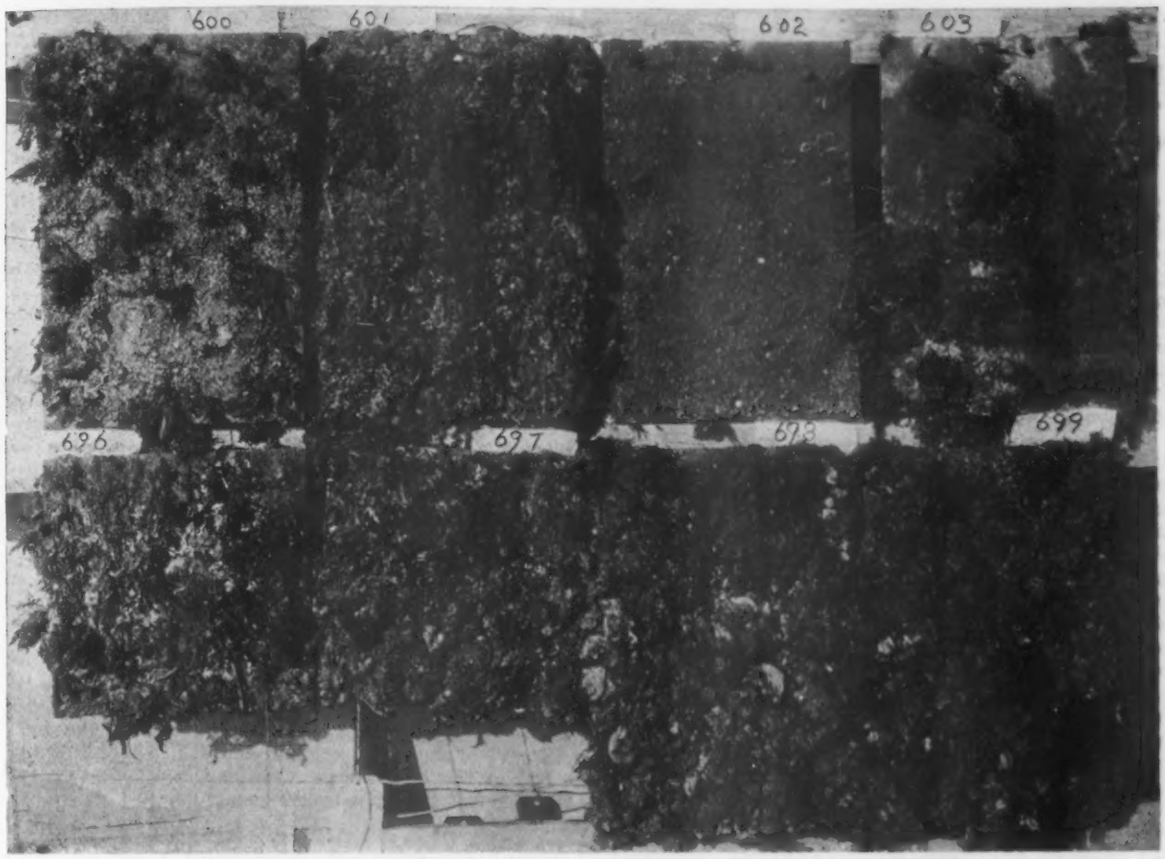
Sample plates of corrosion-resisting chromium steels were obtained and submerged at the bureau of fisheries laboratory at Beaufort, N. C., in connection with other similar tests being conducted by the bureau of construction and repair of the Navy Department. The steels secured for this test contained about 16 per cent chromium in some of the samples and about 28 per cent chromium in others.

Some of these plates were submerged from the test

*United States Navy Yard, Portsmouth, Va.



Same Test Plates as in Illustration on Page 877 After Fouling Growths Had Been Removed. The corrosion-resisting steels showed no corrosion, the marks on them being calcareous deposits and other marks left by the marine growths



Test Plates, with Fouling Growths Attached, as Removed from the Water Dec. 10, 1923, at Beaufort, N. C.

Plate No. 600: Mild steel plate coated with zinc by spraying process. Submerged April 21, 1923. No. 601: Mild steel plate coated with cadmium by spraying process. Submerged April 21, 1923. No. 602: Mild steel plate coated with zinc by spraying process and painted with Navy standard ship bottom paint, two coats anti-corrosive and one coat anti-fouling. Submerged April 28, 1923. No. 603: Mild steel plate coated with cadmium by spraying process and painted with Navy standard ship bottom paint, two coats anti-corrosive, and one coat anti-fouling. Submerged April 28, 1923. No. 696: Plate of corrosion resisting steel, about 16 per cent chromium. Submerged Aug. 24, 1923. No. 697: Plate of corrosion resisting steel, about 16 per cent chromium, ground free from scale. Submerged Aug. 24, 1923. No. 698: Plate of corrosion resisting steel, about 28 per cent chromium. Submerged Aug. 24, 1923. No. 699: Plate of corrosion resisting steel, about 28 per cent chromium, ground free from scale. Submerged Aug. 24, 1923

rack at Beaufort in June, 1923, along with similar plates of mild and soft steels. Other samples were submerged in August, 1923. No protective nor anti-fouling paints were applied to any of the stainless or carbon steel plates for this test. It was found that fouling growths formed on all of these places to an equal extent. The mild steel and soft steel corroded badly, while the chromium steels showed no corrosion. All fouled heavily, the growths including barnacles, hydroids, bryozoa and ascidians (sea squirts). All of these growths, except ascidians, are found on the bottoms of ships. It was concluded from this test that chromium stainless steels have no properties which tend to prevent the attachment of the fouling growths of marine organisms.

Among the many other tests that were made at Beaufort, steel plates that had been coated with zinc and with cadmium by the metal spraying process developed by the bureau of standards were tried with a view to the possible application of the process for coating the bottoms of ships with a preservative coating of metal. Mild steel plates so coated were submerged from the test rack in April, 1923, some without paint and others coated with the regular Navy standard ship bottom paint. It was found that the zinc coated plates resisted corrosion better than the plates coated with cadmium, both when unpainted and when painted, and there were less fouling growths on the zinc coated plates.

In one of the illustrations the upper row shows the fouling growths upon removal in December, 1923, on the zinc and cadmium coated plates, the two first without ship bottom paint and the two last with the usual Navy standard anti-corrosive and anti-fouling paints. In the lower row are shown the stainless steel plates with the fouling growths on them. The other illustration shows the same plates but with the fouling growths removed to show conditions underneath. The stainless steel plates showed no corrosion.

Locomotive Orders and Shipments

The Department of Commerce announces shipments of railroad locomotives from the principal manufacturing plants, based on reports received from the individual establishments, as follows, the figures covering the totals and the domestic orders and the foreign business being the difference:

	Shipments		Unfilled Orders	
	Total	Domestic	Total	Domestic
1920 monthly average...	199	110	1,323	894
1921 monthly average...	112	69	337	206
1922 monthly average...	106	88	889	791
1923 monthly average...	266	249	1,592	1,513
1924				
January	151	147	376	344
February	99	92	499	466

Canada's Steel Output

The Canadian output of steel in 1923 was 884,700 gross tons, or 82 per cent over that for 1922 and 33 per cent over the 1921 figure. The record month for the year was August, when 105,066 tons was produced. The output of steel ingots and castings in December was 41,248 tons, the minimum production for any one month of the year.

The production of pig iron during 1923 was 880,018 tons, a gain of 130 per cent over the previous year, Consul General Albert Halstead, Montreal, reports.

BOOK REVIEWS

Petroleum Register: January 1924, edition; 529 pages, 8⅝ x 11½ in., published by Oil Trade Journal, 350 Madison Avenue, New York. Price, $10.

This is the third volume of the semi-annual edition as distinguished from the annual numbers previously published. It has been considerably enlarged during the past year and subjected to much revision. It now contains information on over 13,000 companies and individuals engaged in all branches of the oil industry, in addition to its tabulations of production and other statistics, and its maps. It lists books devoted to the oil industry, refineries and their traffic connections, natural gasoline absorption and compression plants, etc.

In the statistical section one of the items of most interest is that showing the world's production of crude petroleum year by year since 1857, in which year the entire supply was provided by Roumania. Figures for 1922 show that Roumania provided less than 1.2 per cent of the world's total. The United States first entered the figures in 1859; last year we produced 65 per cent of the total. Mexico first entered the table in 1901 and last year produced more than the whole world produced in 1901. Russian production, which has fallen off more than 60 per cent during the past 20 years, was the largest in the world during the years 1898 to 1901 inclusive. It is now only a little more than 4 per cent of the total and is less than 7 per cent of the amount produced by the United States.

In the map section are shown the locations of fields in each oil producing state of the United States, both oil and gas being indicated. Among the foreign maps are those of Argentina, Bolivia, Canadian Northwest, Colombia, Dutch East Indies, Mexico and Venezuela.

The annual report of the director of the Bureau of Standards for the fiscal year ended June 30 is a volume of 330 pages. As usual, it consists almost wholly of the reports of the scientific and technical divisions of the bureau. Among the chief heads under which the reports are segregated are electricity, heat and power, optics, chemistry, mechanics and sound, structural engineering, metallurgy and ceramics. The metallurgical section occupies 34 pages. Many of the investigations reported on have been referred to from time to time in these columns. The year covers in part the régime of Dr. George K. Burgess, who became director of the bureau on April 21, succeeding Dr. Fay C. Brown, who had been acting-director from Jan. 1 after Dr. Samuel W. Stratton resigned to become head of the Massachusetts Institute of Technology. The report is probably obtainable on application to the division of publications, Department of Commerce, Washington.

George Pilcher, assistant editor of the *Statesman*, Calcutta, has written a pamphlet of 34 pages entitled "A Factor in India's Progress." The sub-title, which indicates more definitely the subject matter, reads: "Being the written evidence given before the Indian Tariff Board as to the effect of cheap steel on the future of commercial progress in India." The pamphlet is published by Longmans, Green & Co., London and New York. The author discusses the proposed protective tariff on steel which has been under consideration by the Tariff Board. He is opposed to protecting steel, considering that the imposition of the tariff that is urged would benefit chiefly a single interest, the Tata Iron & Steel Co. It is argued that the great industries of Bengal—coal, jute and tea—would be adversely affected, and the effects are gone into in detail. The argument stresses the point that if imports are reduced by the proposed tariff the agricultural classes of India, numbering over 2,000,000, will suffer. The author combats the argument that the steel industry should be protected on the ground of sacrifices made by it in the public interest during the war and of the savings now being effected, and to continue until 1927, on public (railroad) contracts calling for the delivery of some 90,000 tons of Indian rails and fish plates per annum. It appears from the pamphlet that steel making costs have increased in recent years due to considerable advance to labor in India. The Tata company is criticised for its failure to build up large reserves against post-war depreciation, and also because of the encouragement it gave to "the nation that the first duty of the directors even of nascent industries is to dazzle their shareholders with large payments of dividends." There is also criticism of the fact that the Tata Iron & Steel Co. has accepted the Swansea or mean of British and American cost of production as the basis price for its supply of steel to its subsidiary companies.

Under the title "Facts About Peat" the Canadian Department of Mines has issued a 48-page booklet giving the peat resources of Canada and their possibilities as a source of fuel. The bulletin takes up the possibility of removing water from peat by pressure, while its evaporation by artificial drying, and the subjects of briquetting, carbonization and recovery of by-products are discussed. Copies of the bulletin may be obtained on application to the Department of Mines, Ottawa.

Information on coal, for the coal buyer, has been compiled in a 24-page pamphlet published under the authorship of Wightman D. Roberts by the *National Coal Mining News*, Charleston, W. Va. It includes tables on the delivered costs of coal with varying percentages of moisture, sulphur and ash in the coal, and tables of the analyses of American coals. A price of 50 cents has been put on the pamphlet.

New Books Received

Cost Accounting Fundamentals: From the Standpoint of Management. By L. T. Konopak. Pages 235, 6 x 8¾ in., with 33 figures. Published by the Ronald Press Co., 20 Vesey Street, New York. Price, $3.

Fowler's Mechanical Engineer's Pocket Book, 1924. Edited by William H. Fowler. Pages 560, 4 x 6 in., illustrated. Published by Scientific Publishing Co., Manchester, England. Price, 3s. 3d.

Fowler's Mechanics' and Machinists' Pocket Book, 1924. Edited by William H. Fowler. Pages 448, 4 x 6 in., illustrated. Published by Scientific Publishing Co., Manchester, England. Price, 2s. 3d.

Fowler's Electrical Engineer's Pocket Book, 1924. Edited by William H. Fowler. Pages 514, 4 x 6 in., illustrated. Published by Scientific Publishing Co., Manchester, England. Price, 3s. 3d.

Atlas of Traffic Maps. By Charles E. Wymond. Some 30 maps, folded in an 8 x 11-in. volume. Published by LaSalle Extension University, Chicago. Price, $4.50.

The Journal of the Institute of Metals. Vol. xxx. Edited by G. Shaw Scott, Secretary. Pages 838, 5½ x 8½ in.; illustrated. Published by Institute of Metals, 36 Victoria Street, London, S.W. 1, England.

Handbuch des Materialprüfungswesens. By Otto Wawrziniok. Pages 700, 6¼ x 9¼ in.; illustrated. Published by Julius Springer, 23-24 Linkstrasse, Berlin W 9, Germany. Price, $5.30.

Die Elektrostahlöfen. By E. Fr. Russ. Pages 471, 6½ x 10 in., 439 illustrations. Published by R. Oldenbourg, 8 Glückstrasse, München, Germany. Price, bound, 15.50 gold marks ($3.70); unbound, 14 gold marks ($3.35).

Coke and Its Uses. By E. W. L. Nicol. Pages 134, 7½ x 10 in., 11 plates. Published by Van Nostrand Co., 8 Warren Street, New York. Price, $5.

Electrical Pocket Book, 1924. Pages 326, 4¼ x 6½ in.; figures, 141. Published by Emmott & Co., Ltd., Mechanical World office, 65 King Street, Manchester, England. Price, 1s. 6d.

Hütte-Taschenbuch für Betriebsingenieure. By Akademischen Verein "Hütte" E .V. and A. Stauch. Pages 1271, 5 x 7½ in., illustrated. Published by Wilhelm Ernst & Sohn, 90 Wilhelmstrasse, Berlin, W. 66, Germany. Price, 19.50 gold marks.

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Rigid Steel-Making Costs

WHENEVER in the past steel prices have shown a tendency to decline there has been much talk of liquidation in costs. Today there is no such opportunity. Doubtless that is one reason why steel prices have been holding so well.

That there has been pressure upon steel prices for a long time is obvious. The mills have not operated at capacity, and indeed dipped last December to a rate 28 per cent under the previous high rate. For months buyers have expected to buy at lower prices. All price advances—and the advancing tendency had been general—ceased late in April of last year. Some buyers expected prices to begin declining almost at once, in a sort of automatic way. By various precedents declines would have been expected. It is true the steel market was not entirely firm in the late months of the old year; but if it had conducted itself as it usually has in the past under a similar relation between demand and productive capacity it would have declined in marked fashion.

One important reason why steel prices resisted so well was that the margin between cost and selling price was rather narrow. It was sufficient to produce satisfactory profits on a large operation, but not otherwise. With the advanced level reached in April, the mills began in August to eliminate the 12-hour day, and this added to cost.

Wage reductions are not thought of as a possibility, even though in April of last year a general advance was made and various other advances came later in the year, in connection with the abolition of the 12-hour day.

At various times lower freight rates have been called for as a help in liquidating iron and steel costs. In 1921 there was demand for a large reduction, and in 1922 a small reduction came. The iron and steel industry is likely to pay present freight rates for an indefinite time to come.

Taking the industry as a whole, almost the entire cost of production is made up of labor, freights and capital charges. Neither of the first two can be reduced and to reduce the third means merely to write off a loss. The capital has been put in and cannot be withdrawn.

After the boom of 1920 various economies were possible because various expensive habits had been formed. There is no similar case now. Operations have been conducted economically. There are no extravagances to be cut out.

Economies in methods and introduction of labor-saving machinery and devices are not a recourse at this particular time for they have been sought eagerly, whether prices were advancing or declining or not moving. The industry simply can go ahead along this line as it has been going.

By every dollar that prices decline the industry is out that amount. There is no opportunity to recover a part of the loss. Indeed, as declining prices tend to restrict demand and decreasing production means increasing unit cost, the loss is really greater than the mere change in selling price would suggest. All this being well understood, the steel mills may be expected to contest declines in steel prices with all the resistance they can summon.

The Future of Cast Iron Pipe

FURTHER important developments have been indicated for some time in the cast iron pipe industry. A significant statement is found in the last issue of *Pipe Progress*, published by the American Cast Iron Pipe Co., Birmingham, Ala. After a reference to the perfection of the De Lavaud process of centrifugal casting, and its successful commercial application, there is this statement:

> It now appears that the experimental stages of other methods are about complete and that, before another year is ended, there will be operating on a commercial basis new methods of production which many believe will revolutionize the industry.

It has been known for some time that attempts were being made to perfect a new method, competitive with the De Lavaud, the chief aim being to devise a process which will eliminate the necessity of heat treating the pipe after casting.

The successful termination of these endeavors means much to both makers and users of pipe. The possibility of making by a centrifugal process, whether in metal or non-metallic molds, nearly all the country's consumption means more uniform and in many cases better pipe, made in less time and with less labor. It should mean ultimately lower cost. It would involve also, on

the other hand, the amortization of some of the existing equipment.

The amount of effort expended by cast iron pipe manufacturers in the past two or three years on the development of new processes shows a singular unanimity in the belief that the industry is ripe for a revolution in its methods. That the results will be of benefit to manufacturers, to labor and particularly to users of cast iron pipe is an expectation which the coming year will see well on the way to realization.

High Cost of Replacements

IF a canvass could be made it probably would be found that the majority of thinking men believe that there are weaknesses in our economic condition, the extent of which is not fully recognized. They feel, in other words, that we could not be so prosperous as we seem to be, from a mere survey of the superficial appearances, the wages we are receiving, the profits we report ourselves as making, the manner in which we are living and the fact that we are paying our monthly bills with no strain on credit. The impression is that "something is wrong" and there has been much search for the something.

It will be well, for one thing, to consider carefully the real scope of the increase in the cost of building. The full bearing is the more readily misjudged because the increase appears to give us a profit. If one owns a dwelling house or a factory and the cost of building such a thing doubles, in dollars, then the individual is "worth" twice as much in dollars. He has been given, on the dollar basis, a profit of 100 per cent.

If, as is most commonly the case, the factory will not yield an annual return, in dollars, twice as great as formerly, the owner is likely to feel that he is ahead by a certain amount. He has not doubled his property account and does not expect to receive twice as many dollars in annual return. He does get something more than formerly, and if he carries his investment at the old valuation he feels that he has been very conservative and safe, while he is getting a larger percentage return, more dollars a year, and thus is better off.

But is he conservative and safe? What danger lies in his miscalling his position? It is a great deal better for a man to be rash and know he is rash than to think he is conservative when he is not. In the one case he knows where he stands. In the other case he does not.

Dwelling houses and factories deteriorate and require upkeep. If a man built a dwelling house in 1910 and was able to carry it with his then income, and the present circumstances are that his income is 50 per cent greater, that his ordinary living expenses are 50 per cent greater and that the cost of building, including repairs and upkeep such as painting, is increased 100 per cent, the man is worse off. If the service the house renders is worth only 50 per cent more, in dollars, the house has less intrinsic value than formerly, because it costs 100 per cent more to keep it going.

The case of the factory is much more pronounced, for the average factory not only requires much more replacement of parts year by year than the dwelling house, but also must be improved from time to time to maintain its position. It is no novel experience for the owners of a factory to live year by year with a feeling that their circumstances are "all right" and then suddenly find themselves faced with the necessity of a complete rebuilding. Such lapses were often experienced before the war.

It would be idle to pretend that this point as to the great increase in the cost of upkeep and rebuilding has been overlooked. Few business men have failed to catch the point, in the abstract, but the full significance is not everywhere appreciated. Sufficient allowance is not being made, and in this lies part of the explanation of our appearing to be more prosperous, in the wages and profits we seem to be receiving, than would be thought possible from an appraisal of the amount of work we are doing.

The Economic Waste of Inquisitiveness

WITH a spirit of levity, or so it seemed, the Bureau of Internal Revenue about March 1 ordered all the corporations of the country to report on or before March 15 their dividend payments to all persons during 1923. What that meant to concerns like the United States Steel Corporation, the American Telephone & Telegraph Co. and the Pennsylvania Railroad, whose stockholders are numbered by hundreds of thousands, was evidently not considered. Prompt representations of the sheer impossibility of complying with this order led to an extension of the time to June 15. Even so it will be an herculean task, and when it is done what will be the good of it?

If it be aimed to use the data for any purpose, whether it be to check the returns of individuals or whether it be merely statistical, the bureau will find itself constrained to follow with questionnaires to bankers and brokers respecting their receipts of dividends on stocks that they carry for other persons, and interrogations to individuals as to whether the stocks standing in their names belong to them or to others. It would require a genius to unravel this complicated web.

The uselessness of it all brings out in stronger relief the huge burden of cost that is imposed upon corporations and individuals in complying with governmental inquisitions and fulfilling the demands that result from governmental supervision. The railroad companies know a good deal respecting this and complain of it. No inconsiderable part of the expense of Government is attributable to useless inquiries, but what does not appear is the cost to the private interests that are investigated. We understand, for example, that the work of the Coal Commission cost the Government about $600,000 and the coal operators about $6,000,000.

Similarly the burden of income taxes upon the people is not measured merely by what they pay to the Government. The cost of making the returns, submitting to audits and contesting arbitrary decisions is immense. All of this contrib-

utes to an economic waste of the first order. In other words, a very considerable amount of our available labor is diverted to utterly useless purposes, and unfortunately this diversion affects most seriously the highest class of labor, viz., that of the brain workers.

Much of this is ascribable to the stupidity of Congress in enacting cumbersome laws, much to bureaucratic irrationality in interpreting them, and much to false hypotheses that obsess all parties. Thus, the sleuths of the income tax bureau, nosing around to see that the Government is not being cheated, find frequently that some simple-minded taxpayer has prorated his deduction for a dependent coming of age during the year, ignorant that the department has ruled that if such an event happens previous to Dec. 31 it does not count; and collects perhaps an additional tax of $5 at an expense of $10. This particular kind of inquisition is founded upon the false hypothesis that the major taxpayers are all trying to make evasions (which, in fact, their good sense would not let them do), while the eyes of the bureau are closed to the great and deliberate escape among wage-earners who receive more than $1,000 per annum, run automobiles and pay no taxes by virtue of not being reported by their employers.

ILLUSTRATING to how great an extent industrial progress has been the key to modern civilization, Dr. Zay Jeffries, in the annual Institute of Metals lecture last month (abstracted in THE IRON AGE, Feb. 21 and March 2), compared conditions in the metal industries prior to the fourteenth century with those now prevailing. Iron and steel were then unknown and all castings as well as most worked articles were non-ferrous. The total non-ferrous output the world over exceeded that of steel and iron for a number of years after the latter appeared. Now, owing to increased knowledge of the metallurgy of iron and steel, pig iron output alone is about 20 times that of all non-ferrous metals combined, and steel meets the majority of man's needs. But there is an important change in progress. The world's non-ferrous metal production in 1920 was about two and one-half times what it was in 1890, but that of pig iron was only slightly more than twice. Marked expansion in all non-ferrous industries has been recorded in the last 30 years. This trend doubtless will continue. Increased knowledge of the manufacture and particularly the heat treatment of non-ferrous alloys is resulting in their greater use, supplanting mild steel in some cases. The quotient derived from dividing the world's iron and steel by the total non-ferrous metal and alloy output is growing smaller quite rapidly. It is even suggested that non-ferrous metals, in one form or another, will in time supplant steel and iron, in a very considerable range of their present uses.

AN editorial in THE IRON AGE of March 6 contained this statement: "The existing union bituminous scale, the Garfield scale of late 1919, has been extended for three years, to April 1, 1927." Our attention has been called to the fact that the award of the Robinson Coal Commission, effective April 1, 1920, carried an advance over the Garfield scale of 1919, and that the Robinson Commission award was amended in August, 1920, by an increase from $6 to $7.50 per day for day labor, so that the scale now in effect, which has been renewed for three years beginning April 1 next, is, in fact, much above the Garfield 14 per cent advance of 1919.

Foreign Trade Conference to Be Held in Cleveland

The fourth sectional foreign trade conference held under the direction of the foreign trade committee of the Cleveland Chamber of Commerce will be held in Cleveland April 8. This conference will center its attention on foreign trade to India and Malaysia and will devote its attention largely to the automotive, machinery, rubber, paint and chemical industries. Speakers will include several representatives of the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce.

Dr. Julius Klein, director of that bureau, will address the opening session, and Percy Owen, long associated with the automotive field, who has been appointed head of the automotive section, will discuss "An Outlet for Greater Production." Other speakers will include Frank R. Eldridge, chief of the Far Eastern Division; R. A. Lundquist, Electrical Equipment Division; Charles C. Concannon, Chemical Division; Henry Morse, Specialties Division, and Eugene S. Gregg, Transportation Division.

Alloy Steel Extras Changed

New extras on alloy steel forging squares have been announced by the United Alloy Steel Corporation, Canton, Ohio. Round cornered squares up to but not including 4 in., which heretofore have been sold at the billet rate, will now take the bar price. Round cornered squares 4 in. and up to but not including 6 in. are ¼c. per lb. less than the bar price. Billets 6 in. and over are $5 a ton less than the net ton price of bars. Thus, with chrome nickel bars at 4c. per lb. the price of billets 6 in. and over is $75 per gross ton.

The Iron Age and Its Readers

ONCE in a while the editors get an inkling of the volume of correspondence among IRON AGE readers resulting from a single issue of the paper. For instance, should a name or an address be omitted from an article there is a string of requests for the information.

The promptness with which printed suggestions are followed—that is, sometimes—and the confidence shown are also noteworthy. Recently a manufacturer received a purchase order for devices with no other notation than that they were to be like those described in THE IRON AGE, the question of price not being raised but only the date of shipment.

The lasting influence of IRON AGE messages is also periodically proved. R. D. Gwynne, purchasing agent of the Gypsy Oil Co., Tulsa, Okla., in an address at the fifth anniversary meeting of the Tulsa Association, of which he was the first president, said: "Tulsa Association was born as the direct result of my having read a little item in THE IRON AGE referring to a meeting of the Purchasing Agents Association of St. Louis."

STEEL IMPORTERS ACTIVE

Buying by Warehouses—Better Grade Steel for United States—Japan Asks for Pipe—China Buys Machine Tools

NEW YORK, March 18.—Importers of European steel are extremely active and while numerous quotations are being submitted on French, Belgian or German material, the actual tonnage of business booked is not proportionately large. With the exception of a few 1000-ton lots that are reported to have been sold to warehouses in Boston, New York and Philadelphia, most of this business seems to be confined to sales of a few hundred tons. Warehouses in Atlantic Coast cities seem to be among the most active buyers of this material. In addition to the importers and exporters long established, who are offering European steel, some of them representing large interests in France, Belgium or Germany, there are a number of companies quoting through British or Continental exporters and furnishing steel regardless of country of origin but subject to acceptance by the buyer upon delivery. It is reported that in some instances cash in 60 days is being offered as terms.

Importers Quotations Still Low

Among current inquiries is one from a Brooklyn, N. Y., warehouse for about 100 tons of bars, rounds and flats and a dealer is reported to be accepting quotations on 1000 tons of plates for a third party. A Philadelphia warehouse recently reported to have purchased 1000 tons of angles of which several hundred tons were rejected, because of quality, states that the order was for 100 tons of angles of which 65 tons were rejected because of metric measurements, too much weight in the fillet and damage in transit.

While low quotations are still being made by importers, those selling French steel claim that their prices have increased in the past few weeks. Quotations are apparently still being made, however, at from 2.10c. per lb. to 2.20c. per lb. base on plates; 2c. to 2.10c. on bars and 2.05c. to 2.10c. per lb. on structural steel, all these prices, ci.f. Atlantic port, duty paid. On blue annealed sheets, some importers claim to be unable to quote competitive prices, while others offer as low as 3c. per lb. base, c.i.f. Atlantic port, duty paid.

Of the material being imported the larger orders are generally placed with the more prominent Continental mills and purchased subject to inspection by Hunt's, Lloyd's or some other reputable and accepted inspectors. On most of these orders also, American specifications as to tensile strength, size, etc., are furnished, although almost always in basic Bessemer instead of open-hearth steel. One importer who has sold several thousand tons of structural material subject to Hunt's or Lloyd's inspection offers either the American specification for tensile strength of 55,000 to 65,000 lb. per sq. in. or British specification of 63,000 to 73,000 lb. per sq. in.

Better Quality for United States

Importers point out that there is considerable confusion among buyers over the quotations made by Continental mills, f.o.b. Antwerp, which, as a rule are considerably lower than the c.i.f. price quoted here would figure back to after deducting ocean freight, insurance, duty and reasonable profit for the importer. Sellers here point out that these quotations are not on material comparable to the quality and specification demanded by American consumers. As a rule this steel is not subject to rigid inspection and in the case of beams is on small sizes not exceeding 40-ft. lengths, while American demands range up to 60-ft. Material of this length can be shipped by the mill in single freight cars, while structural steel ranging up to 60-ft. long requires an extra car and special loading precautions to carry it to the port. In addition, there is the necessity of shipping by certain ships, many of the smaller steamers being unable to conveniently carry such lengths. All this, including the more rigid inspection required at the mill in order to pass the inspecting companies, results in a higher price than that quoted on average material, which is absorbed in markets where price is the principal consideration.

Japan More Active

The Japanese market exhibits more activity than for some time past, but merchant buying from this source is still at a low ebb. Current inquiries are either municipal or from the larger corporations. A noteworthy tender on which bids have recently been submitted is from the Tokio Gas Co., for 1,600,000 ft. of ¾-in. gas pipe. Among current inquiries for small lots of rails is one from the Okazaki Electric Railway for 6½ miles of 60-lb. sections and another from the Aichi Electric Railway for 2 miles of 75-lb. sections. In addition there is the inquiry of the Kei-Hin Electric Railway (Tokio-Yokohama) for 6 miles of 100-lb. sections, the tender from Kobe municipality for a small lot of frogs and switches and the Imperial Government Railway's inquiry for 500 tons of sheet piling.

A fair volume of business is being received from Chinese markets for the usual grade of material purchased by the merchants. Although the tender issued by the Chinese Eastern Railway some time ago is not yet reported to have been closed, an export house reports the sale of several lathes from stock in China and a milling machine, shaper and drill-press from American builders, to the Chinese Eastern. This was part of a tender, the machines on which totaled about $200,000, the remaining business having been placed with European bidders, among whom was a German machine-tool builder.

A tender from Porto Rico for a 30-in. penstock, double riveted, varying from ¼ to ⅝ in. and 2300 ft. long resulted in a low bid from the McClintic-Marshall Co. of $33,765, f.a.s., New York.

An inquiry has been issued by Francisco Seiglie, Cerro 609, Havana, Cuba, for two used Babcock & Wilcox boilers, complete with steel heads, tubes in good condition and a combined capacity of 1200 hp. Quotations must be made, c.i.f. Havana.

French Steel and Pig Iron in 1923

The steel output of France for 1923 is now put at 4,976,869 tons, compared with 4,686,866 tons in 1913. According to grades it was as follows for the respective years in tons:

	1923	1913
Bessemer, acid	95,989	252,704
Bessemer, basic	2,922,345	2,806,475
Open-hearth	1,896,850	1,582,478
Crucible	13,514	24,085
Electric	48,171	21,124
	4,976,869	4,686,866

One feature of these figures is the large increase last year over 1913 in the electric steel output and also the decided decrease last year compared with 10 years ago in the production of acid Bessemer steel.

The production of pig iron in France in 1923 is given as 5,299,581 tons. Of this total 60,676 tons was made in electric furnaces, the rest being coke iron. Of the total, also, 1,156,571 tons was foundry iron, 3,580,384 was steel making iron for open-hearth furnaces, the Bessemer iron being only 23,090 tons.

Austrian Iron and Steel Production in January

In January the Alpine Montangesellschaft, which produces the greater portion of iron and steel in Austria, mined 81,336 metric tons of iron ore, acting Commercial Attaché William Ford Upson, Vienna, informs the Department of Commerce. It produced 37,468 tons of pig iron, 32,585 tons of steel ingots and 21,501 tons of rolled products. The unfilled orders on hand at the end of the month amounted to 42,648 tons. Prices for pig iron per ton were: 1,900,000 crowns ($27); semi-finished products, 2,620,000 crowns ($37.40); iron bars, 3,075,000 to 3,475,000 crowns ($43.90 to $49.60); girders, 3,000,000 crowns ($42.85); hoop iron, 3,975,000 crowns ($56.80).

Iron and Steel Markets in Europe

Threats of Impending Shipbuilding Lockout and Coal Stoppage Hamper England—Germany Active and Prices Rising—Luxemburg Relighting Furnaces

(*By Cable*)

LONDON, ENGLAND, March 18.

WITH a further decline in foundry pig iron, buyers are still hesitant, but makers complain that prices are unremunerative. Export buying is stagnant, though improvement is hoped for, owing to the recovery of the franc.

There is an easy undertone to hematite, though prices nominally are steady. Two North East Coast furnaces were banked last week and others will follow unless there is a revival.

Foreign ore is dull. Bilbao Rubio is held at 23½s. ($5.03) c.i.f. Tees, nominal. There is no relief in coke prices.

Finished steel still is dull. Consumers are awaiting reductions in both British and Continental prices before committing themselves. Possibility of a national shipyard lockout and coal stoppage are disturbing factors.

There is an easy tendency to export quotations on steel. Scottish makers have modified their domestic prices on ship plates and ship sections. The shipyards have booked 16 vessels for the Australian meat trade. Important Spanish orders for railroad material and rolling stock have been placed in England.

British February exports of pig iron, excluding ferroalloys, were 33,282 tons, which includes 9392 tons for the United States. The total exports of iron and steel were 330,523 tons.

Continental markets are firm, though prices are nominal in the absence of big business. Merchant bars are being sold at £7 (1.34c. per lb.).

Tin plate is in better inquiry, makers generally quoting 25s. ($5.35) basis, IC, f.o.b., though "second-hands" are offering at 24s. 9d. ($5.29). There is an improved export demand from Roumania, France, Germany, Australia and South America.

Galvanized sheet market is quiet. Makers are quoting 24-gage at £18 5s. (3.49c. per lb.), but would accept around £18 (3.44c.) for a good line.

GERMAN IRON AND STEEL MARKET

Prices Higher for Bars and Thin Sheets—Increase of 7 Per Cent in Two Weeks

(*By Radiogram*)

BERLIN, GERMANY, March 17.—Producers are quoting 140 gold marks per metric ton for steel bars and 200 marks for thin steel sheets.

[These figures correspond with 1.51c. per lb. for bars, and 2.16c. per lb. for sheets. Two weeks ago the dealers' price for bars was 133 m. (1.44c.), while the producers' price was 128 m. (1.38c.). Two weeks ago thin sheets were 185 m. (2c.).]

Heavy Buying Resumed—10-Hr. Day General—Price Fixing Inoperative

BERLIN, GERMANY, March 3.—The improvement in the international steel market has coincided with an all-around recovery of German trade and with a general revival of confidence. The currency has remained stable. The State finances, which in October showed the taxation yield to be covering less than one-thousandth of expenditure, practically balanced in January, the month's deficit being less than $500,000; and commodity prices fluctuate very slightly, and within the margin of movement observed in the European countries with best currencies.

The price-fall which began in early December seems to have come to an end. The last official commodities index, for Feb. 26, shows 118, or 18 per cent above prices of 1913-14; the last cost-of-living index shows 105, or only 5 per cent above. The abnormally low cost of living is due to two factors: necessary foods average about 16 per cent cheaper than in 1914, and rents continue to be restricted. The average Berlin working-class family's weekly rent is only 1.10 gold marks, or slightly over 26 cents. Germany's ability to compete in the international market is no longer in doubt.

The 10-hr. day has now been generally put through, in most cases by agreement between employers and employed. In the Solingen steel branch the agreement provides for a 56-hr. week.

Settlement Ratio on Industrial Bonds

The position of the steel and iron concerns has been much strengthened by the legislative settlement of the industrial bonds question. By decree under the "Empowering Law" (Ermaechtigungsgese'z), which created an economic dictatorship, it is enacted that industrial bonds, together with mortgages and all other secured debts, may be restored to not more than 15 per cent of their original gold value.

As such debts were, owing to the mark's fall, depreciated to the one-trillionth part of their original gold value, the decree gives a considerable sop to bondholders; but it also relieves those debtor corporations which, before the war, had heavy bonded debts, and which, while still owning the buildings, plant, etc., in which the borrowed money was invested will repay less than one-sixth of their original debts. Of the corporation's gains the Republic by means of a tax, will take only a small fraction; and the corporations will not be called on to redeem the bonds before 1932.

Nearly all the important occupied-district industries have now made separate agreements with the French concerning import and export duties, enforced deliveries, etc. The latest agreements were made by the automobile and bicycle industries. The issue of statistics of Ruhr coal output has been resumed. Output in 1923 was 42,122,369 metric tons, of which 34,131,678 tons were produced in occupied territory. These figures exclude the French-managed mines. In 1922 Ruhr output was 93.788.000 tons. In January this year output rose to 6,187,481 tons, or 237,980 tons per working day, against 369,743 tons in 1913.

Steel Orders in Great Volume

Conditions in the steel market have very considerably improved. Although unemployment is still serious, the proportion of wholly unemployed in the steel branches Jan. 31 being 24.43 per cent, and of partly unemployed 34.24 per cent, the general stagnation has come to an end. Both domestic and foreign buying have been resumed on a great scale, in particular in

British and Continental prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.28 per £1, as follows:

Durham coke, delivered	£1 12½s.			$6.96
Bilbao Rubio ore†	1 4			5.14
Cleveland No. 1 foundry	4 15½			20.44
Cleveland No. 3 foundry	4 11½			19.58
Cleveland No. 4 foundry	4 10			19.26
Cleveland No. 4 forge	4 9			19.05
Cleveland basic	4 15			20.33
East Coast mixed	5 0			21.40
East Coast hematite	4 19	to £5	0s.	21.19 to $21.40
Ferromanganese	17 0			72.76
Rails, 60 lb. and up	8 15	to 9	15	37.45 to 41.73
Billets	8 0	to 8	5	34.24 to 35.31
Sheet and tin plate bars, Welsh	8 18¾			38.25
Tin plates, base box	1 4¾	to 1	5	5.29 to 5.35
				C. per Lb.
Ship plates	9 10	to 10	0	1.82 to 1.91
Boiler plates	13 0	to 13	10	2.48 to 2.58
Tees	9 10	to 10	0	1.82 to 1.91
Channels	8 15	to 9	5	1.67 to 1.77
Beams	8 10	to 9	0	1.62 to 1.72
Round bars, ⅜ to 3 in.	10 10	to 11	0	2.01 to 2.10
Galvanized sheets, 24 g.	18 0	to 18	5	3.44 to 3.49
Black sheets, 24 gage	13 10	to 13	15	2.58 to 2.63
Black sheets, Japanese, specifications	15 5			2.91
Steel hoops	12 10	& 12	15*	2.39 & 2.44*
Cold rolled steel strip, 20 gage	17 2½			3.27

*Export price. †Ex-ship, Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

(Nominal)

Foundry pig iron:				
Belgium	£4 4s.	to £4	5s.	$17.97 to $18.19
France	4 4	to 4	5	17.97 to 18.19
Luxemburg	4 4	to 4	5	17.97 to 18.19
Billets (nominal):				
Belgium	6 0	to 6	5	25.68 to 26.75
France	6 0	to 6	5	25.68 to 26.75
Merchant bars:				C. per Lb.
Belgium	7 0			1.34
Luxemburg	7 0			1.34
France	7 0			1.34
Joists (beams):				
Belgium	6 10 and upward			1.24
Luxemburg	6 10 and upward			1.24
France	6 10 and upward			1.24
Angles:				
Belgium	8 0	to 8	5	1.53 to 1.58
¼-in. plates:				
Belgium	7 15			1.48
Germany	7 15			1.48
⅜-in. plates:				
Luxemburg	7 15			1.48
Belgium	7 15			1.48

bars and sheets, while there is a big demand for wire. The improvement was so sudden that it caught some producers unawares. Having disposed of old stocks, they could not meet the demand for new; and some firms now refuse to deliver in a shorter term than ten weeks.

Krupps and the Stinnes-controlled Bochum Verein have received Government orders from the South African railroads, having underbid English firms. The tube market is still dull. Heavy price-cuts, totaling 40 per cent since Dec. 1, have failed to attract home buyers and have not enabled Germans to undersell foreign competitors. The scrap iron market has improved. In Düsseldorf has been founded a scrap exchange. The Solingen fine steel branch complains of bad business. German buyers will not pay more than 30 to 40 per cent above the prices of 1914. In the intervening ten years coal has risen 100 per cent, steel 50 per cent, high-quality Swedish steel 60 per cent, celluloid 60 to 100 per cent, oils 100 per cent, and packing materials 50 to 100 per cent. The Solingen companies have of late been selling at a loss, competing against one another, and big stocks are not on hand.

The Leipzig Spring Fair promises, in the metal as well as in other branches, to be a big success; but the chief buyers will be Germans. From Leipzig and from other centers comes the news that, since the currency stabilization, Germans have begun to demand high-quality goods. This is a reversal of the post-war tendency so far.

Prices Out of Control

Steel and iron prices are no longer controlled and chaos exists in the market. The general tendency is slightly upward. The Iron Industry Union and the Founders' Association both last week rejected proposals to cut their prices, alleging that their present prices are below production cost. The following are dealers' (not producers') prices per metric ton, as quoted in the Düsseldorf district:

	Gold Marks	
Bars	133	1.44c. per lb.
Construction forms	128 to 130	1.38 to 1.40
Thick sheets (5 mm. and over)	150	1.62
Medium sheets (3 to 5 mm.)	165	1.78
Thin sheets (1 to 3 mm.)	175	1.89
Thin sheets (under 1 mm.)	185	2.00
Wire rods	155 to 160	$37.50 to $38.72

The attempt made last month by producers of semi-finished materials and rolling mill products to fix advisory, non-binding prices failed. The producers undersold one another, ignoring their promises not to do so. Syndicates and combines have either entirely disappeared or have been renewed in much looser form. The officially founded Iron Industry Union (Eisenwirtschaftsbund), which was created by Minister of Industry Wissell as a future nucleus for semi-Socialization, has long ceased to fulfill any functions; its existence is ignored by the three interested classes—the producers, consumers and employees; and its formal liquidation is expected. The loose coal sellers' organization which succeeded the dissolved Westphalian Coal Syndicate has no authority, and the member firms ignore its directions as to prices.

The German Steel Syndicate (Deutsche Stahlbund) is about to be dissolved. This organization has represented the steel producers ever since the break-up of the Steel Works Association (Stahlwerksverband), which originally was a selling organization. Until the end of 1923 the Steel Syndicate fixed "guiding prices" for semi-finished materials and rolling mill products. The Steel Works Association, which will continue to exist in the form of a share corporation, will take over the remaining functions of the Steel Syndicate. An attempt is being made to revive the Tube Syndicate (Roehrensyndikat).

LUXEMBURG IRON AND STEEL

Decided Improvement Causes Relighting of Furnaces—Exchange and Freight Embargo Bother

LUXEMBURG, March 3.—Dating from the second fortnight of January, there has been a marked revival of the iron and steel industry in Luxemburg. The plants have booked a good many orders and, owing to the increased demand, several furnaces have had to be relighted.

The transport problem is causing a good deal of thought. Disorganization prevails in Belgium, while interdiction of shipment lies heavily, especially at export, on all products or raw materials originating in Luxemburg. The railroad stations have received orders to refuse on certain days all shipments for Antwerp. Industry in Belgium is not submitted to such restrictions.

In spite of this obstacle Luxemburg has been successful in Belgium; an order for 9000 tons of rails has been placed into the hands of "Columeta" (Arbed and Terres-Rouges) by the Belgian State Railroad, at from 650 to 725 fr. per metric ton ($24.70 to $27.55 per gross ton); some of the leading Belgian concerns (Cockerill, one of them) joined in.

The uncertainty of exchange is reflected in the

metallurgical market; the demand, mostly speculative, is large and bears on such important tonnages of material that producers are cautiously holding off. This explains partly the absence of the Luxemburg plants from the export market. The following are nominal prices translated at $4.30 per £1:

Bars, £6 15s. to £6 17s. 6d. f.o.b. Antwerp (1.30c. to 1.32c. per lb.).
Beams, £6 5s. to £6 7s. 6d. (1.20c. to 1.23c. per lb.).
Wire rods, £7 17s. 6d. ($33.86).
Rods, £8 1s. to £8 15s. (1.55c. to 1.68c. per lb.).
Heavy sheets, £7 12s. 6d. and £7 15s. (1.46c. to 1.49c. per lb.).

In 1923 the Grand-Duchy of Luxemburg produced 1,406,666 tons of pig iron, against 1,685,700 tons in 1922, and 1,197,739 tons of steel, against 1,394,103 tons in 1922. This decrease in production was due to lack of coke.

Blast furnaces active in the Grand Duchy on Jan. 31 were:

Arbed: All 6 at Esch sur Alz; 5 of the 6 at Dudelange; Dommeldange (3) out of work.
Terres-Rouges: All 6 at Belval; Esch (5) out of work.
Hadir: 8 of the 10 at Differdange; Rumelange (3) out of work.
Rodange: 4 out of 5.
Steinfort: All 3.

Iron and steel production for the month of January were:

Pig iron: Foundry iron, 55 tons; basic iron, 161,857 tons; affinage iron, 305 tons; total, 162,217 tons.

Steel: Basic Bessemer steel, 144,854 tons; open-hearth, 1218 tons; electric steel, 506 tons; total, 146,578 tons.

Germany Awaiting Disposition of Micum Contracts

Ruhr and Rhineland Industries Greatly Improved in Recent Months, but Demand Relief Under Any Continuation of Contracts Expiring April 15

Special Correspondence

COLOGNE, GERMANY, March 3.—After five months' absence from the Ruhr I revisited that section during the past week and came in personal contact with leading industrial officials. Summed up briefly, the immediate future of the Ruhr and Rhineland hinges on the action to be taken on or before April 15 next with respect to the present "Micum" contracts.

The Micum contracts cover the present working arrangement as between the Germans and French. These contracts were signed after passive resistance ceased. They expire on April 15. The word Micum is an abbreviation for Mission Interalliée Contrôle des Usines et Mines. The contracts were signed on the part of the Germans by prominent mining men representing the industry and provided for certain outputs under specified conditions.

When I left the Ruhr in September last, passive resistance had failed. The Ruhr and Rhine territory had seen an almost complete cessation of work. Railroad tracks between many towns were mere streaks of red rust, grass was growing on railroad platforms, and as far as the eye could reach no smoke could be seen emerging from a single chimney. It was as if a pall had descended on what was the most intensive industrial section of the continent of Europe.

Today all this is changed. Trains are running both often and efficiently. No more crowded railway stations with the mobs waiting for some occasional train to come along. People are working. The rentenmark is in circulation and men and women are actually saving. There is no more rushing to the shops with the paper marks earned for the day and spending all because of the certainty that the morrow would find the purchasing power less. There is food in the shops, plenty, and good meals can be had in the restaurants. The prices are high, high for Germany, but corresponding very closely to the prices prevailing in New York when I was there in January.

But the important thing which impressed me was the rise in morale. It was not until the French broke the German morale in September that they were able to overcome passive resistance. The Germans themselves do not appreciate the change that has taken place. One must return after an absence properly to note it.

Whenever I put the question, the German reply was to the effect that the Micum contracts under present terms could not be renewed. The Germans declare that the French give them no hope for encouragement for better terms, and that today the mines are losing 6 to 8 marks per ton on coal mined. This situation, they declare, cannot continue. Individual mines may be able to carry on for a few months and pocket the loss, hoping for something better to eventuate, but they feel that the ultimate outcome is bankruptcy under present terms.

Such is the German view. The French contention, I understand, is to the effect that the Germans can operate without loss under present terms provided they work efficiently, and as evidence the French point to seven mines they are working themselves in the Dortmund region at 110 per cent efficiency as compared with pre-war German figures. The French are paying increases in wages for all coal mined over a stipulated minimum, and the German workmen employed by them are receiving more wages today than before the war.

The Germans here answered this claim of French super-efficiency by saying that the French are taking the coal from locations wholly with reference to swelling the pile at the pit entrance and that the mining is not being conducted along lines which would necessarily be the case having regard to long workings into the future.

Under present arrangement the German mines now lose, it is claimed, in reparations 23.5 tons out of every 100 tons mined. This reparation coal goes to the French, Belgians and Italians. For mine overhead there is required on an average of 13 per cent. This brings the total mine loss up to 36.5 tons out of every 100 tons. The actual cost of mining this coal today, it is declared, is 23.87 gold marks per ton.

Among the German contentions it is claimed that a loss of 40 per cent of mined coal makes it impossible to compete in foreign trade. While the coal paid in reparations is credited to the account of the mine owners by the German Government, that Government makes no payment.

About 75 per cent of the 1913 coal output is now being mined. This refers to the Westphalian region, which comprises the Ruhr and Rhineland. The Ruhr mine owners point out that overhead, apart from what Micum contracts impose, call for 8 marks in wages per ton throughout the organizations, and that overhead in operations brings the sum up to an average of 15.16 marks, or 1516 marks per 100 tons of coal mined. The difference between 15.16 marks and 23.87 gold marks above mentioned is attributed by the Germans to the Micum provisions.

Not a few of the German industrials were emphatic in their declarations that it would be impossible to sign

new Micum contracts on the basis of the present terms. The alternative will be to throw the mines into the hands of the French for the latter to work. Such an eventuality would probably mean idleness for a great mass of people and ruin as well for the present owners. Unfortunately the bitterness of feeling existing between the Germans and French makes it difficult to arrive at compromises. The Germans insist on bringing forward their grievances in any discussion of costs of operations.

Apart from the mines, many of the iron and steel and machinery works, comprising both the Ruhr and Rhineland, are working at 20 to 40 per cent. The Rhineland machinery plants during the past three weeks have taken in important orders, but in the matter of forgings and heavy machined parts, the competition of Witkowitz is severely felt. This latter plant is now in Czecho-Slovakia and during the war was one of the main armament works of Austria.

The Krupp works at Essen have effected a reduction in personnel from 54,000 before the war to a present pay roll showing of about 38,000, and more reductions will follow. Krupp shops are working from 20 per cent to 40 per cent full. Orders for steel tires for railroad wheels have been conspicuous and South Africa and India are important objectives.

To the visitor all German argument today appears diffused with complaint. Perhaps the Germans do not recognize themselves that this spirit of complaint effects little. One leading industrial declared to me that he fully recognized now that Germany had lost, that the French were in a position to dictate absolutely, but that he believed better results could be obtained for both sides if a more conciliatory spirit could be aroused.

British Pig Iron and Steel in February

LONDON, ENGLAND, March 18 (*By Cable*).—February pig iron production was 612,700 gross tons, comparing with 631,500 tons in January, with 629,900 tons in December and with 619,800 tons per month in 1923. The output of steel ingots and castings in February was 767,600 tons, exceeding the January record of 690,100 tons, and greater than the average for 1923 of 707,400 tons per month.

Comparative production figures for the British steel industry in gross tons per month are as follows:

	Pig Iron	Steel Ingots and Castings
1913, per month	855,000	639,000
1920, per month	669,500	755,600
1921, per month	217,600	302,100
1922, per month	408,300	486,000
1923, per month	619,800	707,400
January, 1924	631,500	690,100
February	612,700	767,600

Austrian Pig Iron in 1923

Austria's pig iron output in 1923 totaled 344,717 metric tons, of which 14,189 tons was foundry iron, the rest being steel making. The 1922 production was 323,172 tons, 5112 tons being foundry.

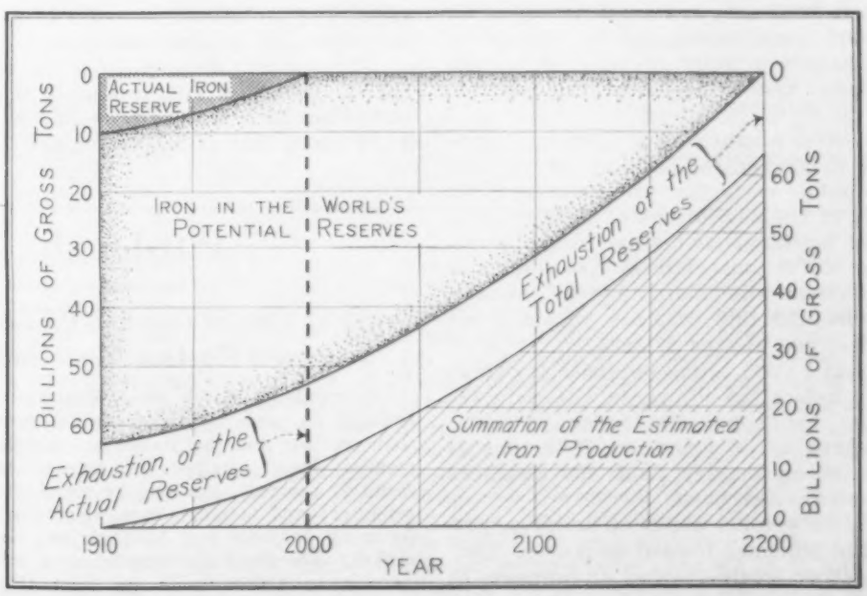
Two sintering machines are to be installed in the works of the Compania Siderurgica del Mediterraneo at Sagunto, Spain. They will be supplied by the Dwight & Lloyd Metallurgical Co., New York, for Frank C. Roberts & Co., Philadelphia, the consulting engineers on the work.

Exhaustion of World's Iron Reserves

ONE of the slides shown by Charles P. Perin, consulting engineer, New York, in connection with his lecture Feb. 21 at Princeton University, on the subject of iron and steel, is reproduced here. It shows in the upper left corner that the 1910 reserve of iron actually in sight in the world amounted to approximately 10 billion gross tons, with an added potential reserve bringing the total to about 63 billion gross tons.

At the accelerated rate of use which has prevailed since 1910, the actual iron reserve, it is estimated, will have disappeared about the year 2000. This is shown by the small cross-hatched area in the upper left corner. In the meantime the reserve now called potential, but which will come more and more into use as time goes on, will be drawn upon and those reserves at present rate of growth of use will be exhausted, it is estimated, about the year 2200, as shown by the stippled area in the upper left-hand half of the diagram.

In the lower right portion is found the estimated cumulative production of iron from ore during the 290 years covered in the survey. This cumulative production amounts at 2000 A. D. to about 10 billion tons, and in 2200 A. D. to about 63 billion tons; these two figures agreeing respectively with the estimated exhaustion on those respective dates of the actual iron reserve and the present potential reserve.



Iron and Steel Markets

NEW BUSINESS LIGHTER

Competition Sharper and Washington Is a Factor

Automobile Schedules Somewhat Reduced—Car Buying Keeps Up—Ore Sales Pending

Steel manufacture continues at the high rate of the past three weeks, but with the majority of producers new business thus far in March has been on a scale somewhat less than the average for February.

Seeing that the larger buying in February, particularly in steel for cars and for new construction, was stimulated by price concessions, some falling off in orders for plates, shapes and bars was to be expected; but there is now the additional factor of hesitation and uncertainty due to developments at Washington.

One year ago the tide of new orders was rising and prices were advancing. Today, while mill shipments are very heavy and steel producers are confindent of a large operation through the second quarter, consumers are increasingly careful about their buying, and in some lines competition among the mills is growing sharper.

Smaller production in the second quarter is planned at some automobile plants, and steel requirements have been cut down accordingly. The Ford Motor Co., which recently reduced its operating schedule, is again in the market for steel bars. Unusually large stocks of cars have been accumulated by various makers, and there are predictions that the output for the year will not reach the record of 1923.

Farm implement makers still hope to show a gain over last year, though granting it may not reach their earlier expectations. However, agricultural consumption of steel is commonly overestimated.

Orders for 7275 freight cars and 80 locomotives, repairs to 3095 cars and fresh inquiries for 5000 cars, 1000 underframes and 56 locomotives show the sustained activity of railroad buying. Southern roads are conspicuous in current negotiations.

Structural steel business is still of large proportions. Of 23,000 tons of bookings nearly one-half was for public work, but private enterprises form the bulk of the 34,500 tons of new projects, though school buildings and other public structures call for 10 000 tons of this. Total sales in February were somewhat more than in January, and the two months this year are within 5 per cent of the first two months of 1923.

On the Great Lakes, active inquiries for three freighters are before the shipyards, the plate and shape tonnage being put at 15,000. Atlantic Coast yards have asked prices on 7200 tons of steel in view of an inquiry from the Southern Pacific Railroad for two boats.

Pig iron, after several weeks of dullness, now shows a marked tendency toward weakness. Concessions are rather freely granted on tonnages of any size and the general trend is downward. Much of the iron bought by middlemen last November as a speculation is still in their hands. Tennessee iron can be more easily obtained at $22.50, Birmingham, though Alabama producers of foundry iron have been more disposed to hold prices than some of their Northern competitors. Silveries have been marked down $1 by at least one important seller.

Cast iron pipe foundries continue to operate on a large scale and look for another year of liberal buying by municipalities and private companies. A large amount of work is ahead in Philadelphia and Detroit plans to buy 20,000 tons. Soil pipe makers estimate that this year's output will be close to the high record of 400,000 tons in 1923.

The opening of the books of Lake Superior iron ore producers for 1924 business may be looked for any day. The Ford Motor Co's. inquiry for 250,000 tons is active and quotations already made vary considerably. More uncertainty exists as to the season's ore price than for several years at mid-March. Basic pig iron is now $9 a ton lower than in March last year, when ore prices were established, and blast furnace companies therefore expect a lower ore basis for 1924.

Sales of European steel, in lots of several hundred tons, for American warehouses on the Atlantic Coast have established a duty paid price of 2.05c. to 2.10c., New York, or $10 to $12 a ton difference in favor of the foreign product. Structural shapes up to 8 in. are included.

British steel markets are upset by prospects of a nation-wide shipbuilding lockout and by threats of stoppage of coal mining.

British prices are lower and the finished steel market is stagnant. Continental prices are higher and much business is being placed. Of the 20,000 tons or more of Belgian and French steel sold since Jan. 1 for shipment to this country bars and pipe were a large part. Some complaint has been made as to the quality of bars. On a recent steel shipment from Antwerp to the Pacific Coast the freight was about $4.25 per ton, whereas rates on Alabama steel to California are nearly $12. Belgian bars have been laid down at Gulf ports at less than the actual cost to American mills.

Pig iron has dropped from $22.86 last week to $22.77, THE IRON AGE composite price being now more than $8 below the price of one year ago, and $4.39 above that of two years ago.

Pittsburgh

Prices of Various Finished Products Unsteady —Pig Iron Very Dull

PITTSBURGH, March 18.—While the past week has brought no perceptible decrease in steel works operations in this and the immediate district, there is increased doubt whether the present rate, averaging about 90 per cent, can long be maintained. With most producers and in most lines, shipments are exceeding incoming business and backlogs are beginning to decrease. The Steel Corporation as a unit is better off as far as order books go than the independents, although it is not heavily obligated on wire products and sheets, despite the fact that it benefited greatly

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 18, 1924	Mar. 11, 1924	Feb. 19, 1924	Mar. 20, 1923
No. 2X, Philadelphia‡	$24.13	$24.13	$24.13	$33.14
No. 2, Valley furnace†	23.00	23.00	23.00	31.00
No. 2, Southern, Cin'ti†	26.55	26.55	26.55	31.06
No. 2, Birmingham, Ala.†	22.50	22.50	22.50	27.00
No. 2 foundry, Chicago*	*24.00*	24.50	24.50	32.00
Basic, del'd, eastern Pa.	21.50	21.50	22.75	30.00
Basic, Valley furnace	22.00	22.00	22.00	31.00
Valley Bessemer, del P'gh.	25.26	25.26	25.26	32.77
Malleable, Chicago*	*24.00*	24.50	24.50	32.00
Malleable, Valley	22.50	22.50	23.00	31.00
Gray forge, Pittsburgh	23.76	23.76	23.76	32.27
L. S. charcoal, Chicago	29.15	29.15	29.15	36.15
Ferromanganese, furnace	107.50	107.50	107.50	120.00

Rails, Billets, Etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Bess. billets, Pittsburgh	40.00	40.00	40.00	45.00
O.-h. billets, Pittsburgh	40.00	40.00	40.00	45.00
O.-h. sheet bars, P'gh	42.50	42.50	42.50	45.00
Forging billets, base, P'gh.	45.00	45.00	45.00	52.00
O. h. billets, Phila	45.17	45.17	45.17	50.17
Wire rods, Pittsburgh	51.00	51.00	51.00	50.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.30	2.30	2.30	2.35
Light rails at mill	2.00	2.00	2.00	2.25

Finished Iron and Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.57	2.57	2.57	2.825
Iron bars, Chicago	2.40	2.40	2.40	2.50
Steel bars, Pittsburgh	2.40	2.40	2.40	2.35
Steel bars, Chicago	2.50	2.50	2.50	2.35
Steel bars, New York	2.74	2.74	2.74	2.69
Tank plates, Pittsburgh	2.40	2.40	2.40	2.35
Tank plates, Chicago	2.60	2.60	2.60	2.50
Tank plates, New York	2.64	2.64	2.64	2.69
Beams, Pittsburgh	2.40	2.40	2.50	2.35
Beams, Chicago	2.60	2.60	2.60	2.45
Beams, New York	2.69	2.69	2.74	2.69
Steel hoops, Pittsburgh	*2.90*	3.00	3.00	3.30

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Mar. 18, 1924 Cents	Mar. 11, 1924 Cents	Feb. 19, 1924 Cents	Mar. 20, 1923 Cents
Sheets, black, No. 28, P'gh.	3.75	3.75	3.85	3.75
Sheets, galv., No. 28, P'gh.	4.90	4.90	5.00	5.00
Sheets, blue an'l'd, 9 & 10	2.90	2.90	3.00	3.00
Wire nails, Pittsburgh	3.00	3.00	3.00	2.80
Plain wire, Pittsburgh	2.75	2.75	2.75	2.65
Barbed wire, galv., P'gh.	3.80	3.80	3.80	3.45
Tin plate, 100-lb. box, P'gh.	$5.50	$5.50	$5.50	$5.50

Old Material, Per Gross Ton:				
Carwheels, Chicago	$20.50	$20.50	$21.50	$28.50
Carwheels, Philadelphia	*18.50*	19.00	20.00	27.00
Heavy steel scrap, P'gh	*19.50*	20.00	21.00	26.50
Heavy steel scrap, Phila.	*16.50*	17.00	18.00	26.00
Heavy steel scrap, Ch'go.	*16.25*	17.00	18.00	24.00
No. 1 cast, Pittsburgh	*20.00*	20.50	21.50	28.00
No. 1 cast, Philadelphia	18.50	18.50	19.50	29.00
No. 1 cast, Ch'go (net ton)	*20.00*	20.50	21.00	27.00
No. 1 RR. wrot. Phila.	19.00	19.00	21.00	28.00
No. 1 RR. wrot. Ch'go (net)	*13.75*	14.50	15.50	21.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	*$4.00*	$4.15	$4.15	$7.50
Foundry coke, prompt	*4.75*	5.00	5.00	8.50

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	*14.12½*	14.25	13.62½	17.25
Electrolytic copper, refinery	13.75	13.75	13.25	17.00
Zinc, St. Louis	*6.45*	6.55	6.92½	8.00
Zinc, New York	*6.80*	6.90	7.27½	8.35
Lead, St. Louis	*9.15*	9.50	8.90	8.25
Lead, New York	*9.15*	9.50	9.00	8.25
Tin, Straits, New York	*53.75*	53.50	53.50	49.25
Antimony (Asiatic), N. Y.	*11.00*	11.25	11.00	8.75

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, March 18, 1924, Finished Steel, 2.746c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

March 11, 1924,	2.746c.
Feb. 19, 1924,	2.775c.
March 20, 1923,	2.710c.
10-year pre-war average,	1.689c.

Composite Price, March 18, 1924, Pig Iron, $22.77 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

March 11, 1924,	$22.86
Feb. 19, 1924,	22.86
March 20, 1923,	30.86
10-year pre-war average,	15.72

in the distribution of the sheets required for the cars recently placed by the large Eastern railroads.

Unsteadiness in the prices of almost all finished products, coupled with the fact that deliveries are still made with great promptness, encourages a conservative buying policy, which is not disturbed even by talk of a possible shortage of labor as the spring approaches and men seek outdoor occupations. The answer probably is found in the fact that the activity which prevailed from about the middle of last December through to about the middle of last month represented a replenishment movement and some anticipation of requirements over the first half of this year. Lately developments in Washington and the stock market have made buyers more cautious.

Wire manufacturers have announced special terms to the distributors of woven fence and fence material. The movement is announced as an effort to help the farmers, but there is also the condition that the demand for fence so far this year has been disappointing. Plates are not strong even at 2.40c. Price concessions are readily obtained on sheets, particularly from the smaller makers. Much irregularity still is observed in prices and makers of bolts and nuts, after having tried to establish an advance after the opening of the present quarter, virtually abandoned the effort and second quarter prices will be no higher than those on which business for this quarter was booked. Boiler tubes are weak and quotations largely are unrepresentative of what actually is being accepted by makers. Much business for second quarter came out in cold finished bars following the presentation of the new card of extras, but none of it will carry the new extras.

There is some indication of lower prices for semi-

finished steel in that the nonintegrated manufacturers appear to be in no hurry to close for the coming quarter's needs having much tonnage due them on contracts for this quarter.

If there was ever a quieter pig iron market than the present one, those now active in the local trade do not recall it. With 113 furnaces now active out of a total of 140 in this and nearby districts, melters cannot be convinced there will not be all the iron they require when they need it, and their interest in the market is in keeping with that idea. They are playing a waiting game and in the meantime, production is piling up. Scrap prices again are sagging and weakness in coke and coal is not without sentimental effect upon the general market.

Pig Iron.—It is doubtful whether the week's business here has amounted to as much as 2000 tons and the largest individual tonnage was 500 tons of Bessemer iron for shipment to Oil City, Pa. Steel companies which do not make their own iron have sufficient supplies to carry them for the next few months and among the foundries which are busiest those making sanitary ware, radiators and cast iron pipe, the supply situation is a very comfortable one. The jobbing foundries are doing poorly, but recent car awards have helped the operating schedules of the steel foundries. Nobody seems to need any iron at present and it is the apparent tendency to wait until prices have reached lower levels before purchases are made. Beside the heavy new production, much of the iron bought last November by middle interests as a speculation still is on their hands. There is no occasion to change quotations, but in the absence of business, they are purely nominal and what an attractive inquiry might produce is an interesting speculation. American Steel & Wire Co. has blown in a second furnace at Donora, Pa., bringing the total number of active stacks in this and nearby districts to 113. The furnace of the Struthers Furnace Co., Struthers, Ohio, is scheduled to go out May 1.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.76 per gross ton:

Basic	$22.00
Bessemer	23.50
Gray forge	22.50
No. 2 foundry	23.00
No. 3 foundry	22.50
Malleable	23.00
Low phosphorus, copper free	$29.00 to 30.00

Ferroalloys.—A fair business is being done in ferromanganese in this district, but in other alloys the market is dull as regards new business and in ferromanganese consumers are not covering as far ahead as usual. We note one sale of 300 tons of British ferromanganese at the regular price for April-May shipment, but sales generally are in smaller tonnages, since the two larger steel companies here produce their own requirements. Domestic material is selling steadily and the leading commercial producer is believed to be fairly well sold out for the second quarter. There has been much talk of higher prices, but no tangible evidence yet that there will be an advance. We make no change in prices. They are given on page 903.

Bolts, Nuts and Rivets.—Although formal announcements have not yet been made, leading makers of bolts and nuts will take second quarter business on the same basis as that booked for this quarter. This generally was at 60 and 10 per cent off list for large machine bolts. Higher quotations are likely to disappear shortly; they mean little since few buyers had to have supplies beyond what they contracted for. Rivets still are quoted at $2.75 base per 100 lb. for large ones, but this is the small lots price and lower figures are being named on large lots, particularly on those running to a few sizes and on sizes carrying big extras. Prices and discounts are given on page 902.

Semi-Finished Steel.—Non-integrated steel makers, notably the producers of sheets, as a rule, did not take all the steel contracted for delivery over the present quarter, and present indications are that the taking in of steel ordered for this period will mean smaller specifications for the second quarter unless there is a substantial increase in finished steel orders in the next few weeks.

Wire Products.—While the demand is expanding, the gain in orders shows up more strongly in nails than in the other products, and this is accounted for by the approach of spring with its greater needs in connection with building work than because of any decided change in the attitude of buyers. There are no signs or expectations of higher prices in the near future and mills are making such good deliveries against orders that jobbers and manufacturing consumers do not see the necessity of anticipating their requirements. Demand from the agricultural districts has been disappointing so far this year, and with an idea of stimulating it and also of helping the farmer to finance his needs, the American Steel & Wire Co. under date of March 10, announced special terms of payment on fence material. Independent manufacturers have followed suit.

Steel Rails.—The Steel Corporation light rail unit has a comfortable order book, but this is not the case with the independents and there is so little passing business and so much competition for it that prices are easy. The range still is from 2c. to 2.15c., base, but it is a pretty small order that does not bring out the lower figure. Steel rail light rails are quotable from 1.85c. to 1.90c.

We quote light rails: rolled from billets, 2c. to 2.15c. base (25-lb. to 45-lb.); rolled from rail steel, 1.85c. to 1.90c. base (12-lb. to 45-lb.), f.o.b. mill; standard rails, $43 per gross ton mill, for Bessemer and open-hearth sections.

Tubular Goods.—Evidently open weather in the more favored sections of the country is permitting building work, because it has been the experience of several makers that specifications for standard pipe, which recently were inclined to lag, again are on the increase. The demand has not reached the proportions or the urgency to be characterized as a scramble, nor have the mills yet had to resort to the expedient of apportioning production; indeed, the mills have operated so well and shipments have been so heavy in the past few months that on the whole jobbers' stocks are probably more nearly adequate than they have been in several years at this time of year. There are no indications of higher prices in the immediate future and this tends to check speculative demand. Oil country goods are doing fairly well, but are not yet comparable in point of activity or in mill engagements with standard pipe. Inquiry for about 715 miles of line pipe to be laid in the Southwest, which was supposed to have been for the Royal Dutch Shell interests, turns out to be for the McCorkle Pipe Line Co. This line, which is to run from the Oklahoma and Texas fields to the Gulf of Mexico, was believed to be for the Dutch company, since it was to run close to the more northerly holdings of that company, and some of the trade still look upon the company as the real buyer, since it is admitted by the McCorkle interests that the inquiry is from a foreign source and that the prospective purchaser has a 60 per cent interest in the projected line. The situation in boiler tubes still is weak, because there are so many more sellers than buyers. There has been no formal price reduction, but concessions are so frequent that the quoted discounts mean little. Discounts are given on page 902.

Sheets.—There is a very fair volume of business, but it is the result of considerable sales effort and much shading of what are regarded as the regular prices on the part of several of the independent companies. The Steel Corporation and some of the larger independents are holding to the bases announced by the former, but are not faring very well and probably will not until those naming lower figures have become filled up. As a result of the recent car lettings by the Eastern roads, orders have been placed for more than 30,000 tons of sheets for roofs. The automobile body makers still are rather conservative buyers and in general the sheet demand lacks the snap it would have if there were prospects of higher prices in the near future. The fact that there is irregularity in prices discourages notions of an immediate advance. Based

on the number of mills reported as under power, the sheet industry as a whole is operating close to 90 per cent. The actual performance, however, is probably below that rate. Prices are given on page 902.

Cold-Finished Steel Bars and Shafting.—Introduction of the new card of extras, adding on an average about $2 per ton to prices, has been a stimulus to contracting with makers generally taking such business on the basis of the old card. It has produced no increase in specifications, because it was well understood that business on makers' books was not subject to the new extras. Producers in this district are holding to 3c., base, Pittsburgh, as a general rule, but all are not ignoring lower prices still being made by a Middle Western maker. Freight to competitive territory is being equalized with Chicago into competitive territory. Ground shafting still is priced at 3.40c., base, f.o.b. mill for lots of a carload or more.

Hot-Rolled Blast.—Price concessions from 3c., base, Pittsburgh, which have been fairly frequent in strips in the past few weeks, now are appearing in the hoop and band sizes and gages and the entire list now is quotable at 2.90c. to 3c., base. This range presumes one of 2.75c. to 2.85c. on hot-rolled strips for cold rolling and for rim stocks. On wide strips, the market hardly is quotable above 2.75c. on the bulk of the bookings. This material has to compete with blue annealed sheets and skelp. Prices are given on page 902.

Cold-Rolled Strips.—Competition for business still is keen enough to prevent a realization of the attempt to establish the market at 5c., base, Pittsburgh. Some business is being entered at that figure, but on the larger tonnages, the prevailing figure is 4.75c. Weakness in the raw material is hurtful to this product in that it makes buyers cautious.

Track Supplies.—Makers of spikes are cutting into their backlogs steadily, since new business is falling well behind completed orders. There has been no formal price reduction, but attractive inquiries are causing some sharpening of pencils. Pennsylvania Railroad still delays action on a substantial tonnage of tie plates. Small spikes are as dull as ever. There is little strength to track bolt prices. Prices are given on page 902.

Structural Material.—Prices are rather uncertain. Mills publicly are quoting 2.50c. base for large beams, but prices reported on structural awards plainly indicate less than the published quotation on the plain material. Compromise agreements have been reached with the building trades by contractors and present signs point to a general settlement and no interruption to building work, except that which may be indefinitely postponed because of the higher labor costs entailed in the new agreements. Some structural steel companies have noted an increase in inquiries lately, while others have found no improvement. Plain material prices are given on page 902.

Plates.—The position of the Steel Corporation is favorable on this product, but not that of the independents, practically all of whom are "hungry" for orders. Too much capacity can be operated profitably at under today's prices for the market to show much strength, and there is the additional factor that all mills are not sharing alike in the business coming out and consuming industries, outside of the car builders, are not crowded with orders. The market is easy at the prices given on page 902.

Tin Plate.—Although there has been a sharp break in the price of pig tin in the last week, the cost of that material still is a factor in the tin plate price. As compared with price that ruled last October when the present price of tin plate was established, pig tin at 51c. per lb. is up 10c. per lb., which, on the basis that there are 1¾ lb. of tin to the base box of tin plate, means an increase in cost of 17½c. per base box. It is claimed that this increase practically wipes out what profit there was in the manufacture of tin plate and that higher prices must be sought unless the reaction in pig tin continues. Higher prices also are predicted for terne plate because of the increase in lead of from 6½c. last October, to 9½c., the current price. Production of tin plate is still on a heavy scale, with leading makers operating their mills as fully as is physically possible. Specifications are heavy and shipments are taken so freely that there are no mill accumulations to speak of.

Iron and Steel Bars.—Though 2.40c., base, still holds in this district on steel bars, it is the experience of mills here that this price no longer is easily obtained outside this district, particularly to the East. Mills still are fairly comfortably fixed with orders, but as a rule, new orders are not making good the completed ones, and buying is largely for nearby requirements. Iron bars are no more than steady as demands are light.

We quote soft steel bars, rolled from billets, at 2.40c. base; bars for cold finishing of screw stock analysis, $3 per ton over base; reinforcing bars, rolled from billets, 2.40c. base; refined iron bars, 3.25c. base, in carload lots or more, f.o.b. Pittsburgh.

Coke and Coal.—Offerings of coke have gained on the demand in the past week to an extent that prices are definitely weaker. We now regard the spot furnace coke market as $4 per net ton at ovens, although a few small sales have been made within the week at $4.15. Interest in second quarter tonnages is almost nil, since the dullness in pig iron is causing several furnace owners to consider the advisability of blowing out their stacks. The asking prices on second quarter tonnages range from $4.25 to $4.50, but it is doubtful whether a bid of more than $4 now could be had. Furnace interests argue that if Connellsville producers can sell coal at as low as $1.50 per ton, a price of more than $4 for coke is unjustified. Foundry coke also is easier, spot tonnages now being obtainable as low as $4.75, as against the recent minimum of $5. The full range on spot tonnages is from $4.75 to $5.50, the latter price being also the prevailing one for second quarter tonnages. The coal market still is very weak with demand almost at a standstill, since important consumers are using up stocks accumulated in the fear of a coal miners' strike. We quote mine run steam and coking coal at $1.50 to $2 per net ton at mines, and mine run gas coal at $2 to $2.25. Steam slack is selling from $1.10 to $1.25, and gas slack from $1.25 to $1.35.

Old Material.—While it was thought in view of the recent steadiness of the market that the bulk of the "distress" material had passed into consuming channels, the fact that the market has developed a fresh sinking spell in the past week makes it apparent that some offerings of this sort still are coming on the market. Sales of heavy melting grade have been made as low as $19.50 at Weirton within the week and while we still include $20 as a quotation, it is almost impossible to get it. Other open-hearth grades also have weakened and blast furnace material cannot be sold at recent prices. The market is very quiet and prices in a number of instances are merely nominal in the absence of sales, being appraisals based on what is offered and what dealers would accept. There is no backed up supply of old material at primary points, as there was at this time last year and for that reason no disposition by dealers to sell the market short, since even a moderate demand from consumers, it is believed, would uncover the lightness of stocks.

We quote for delivery to consumers' mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton
Heavy melting steel	$19.50 to $20.00
No. 1 cast, cupola size	20.00 to 20.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	21.00 to 21.50
Compressed sheet steel	17.50 to 18.00
Bundled sheets, sides and ends	16.00 to 16.50
Railroad knuckles and couplers	22.00 to 22.50
Railroad coil and leaf springs	22.00 to 22.50
Low phosphorus blooms and billet ends	23.50 to 24.00
Low phosphorus plate and other material	22.50 to 23.00
Railroad malleable	18.50 to 19.00
Steel car axles	22.00 to 22.50
Cast iron wheels	20.00 to 20.50
Rolled steel wheels	22.00 to 22.50
Machine shop turnings	14.00 to 14.50
Sheet bar crops	22.50 to 23.00
Heavy steel axle turnings	18.00 to 18.50
Short shoveling turnings	15.00 to 15.50
Heavy breakable cast	18.50 to 19.00
Stove plate	15.50 to 16.00
Cast iron borings	15.00 to 15.50
No. 1 railroad wrought	15.00 to 15.50
No. 2 railroad wrought	19.50 to 20.00

Chicago

Buyers More Conservative—Some Doubts as to the Automobile Business

CHICAGO, March 18.—Sentimentally practically all departments of the iron and steel market are weaker, although actual bookings in some of the heavier finished steel lines have shown no particular change. In fact, new commitments of one important local mill in structural shapes, bars and sheets are still running ahead of shipments, and shipments are the heaviest in history. There is no question, however, that buyers generally have become even more conservative than heretofore in limiting their purchases to specific nearby requirement. This increased caution is attributed to the disturbing influence of the Washington revelations.

On the other hand, it is pointed out that American business is not easily frightened, having passed successfully through the war period and a series of Nation-wide strikes, and that after a short period of hesitation is likely to proceed without further attention to politics. Basic conditions, it is contended, are as favorable as heretofore. In the main, this appears to be true. Railroad car buying continues at a high rate, and construction work is still developing in volume. The condition of the automotive industry, however, is commencing to cause concern. Production is still large, but heavy stocks of unsold cars have accumulated in storage and automobile makers are looking forward to milder weather in the hope that it will stimulate sales.

Prices of finished steel have been affected in varying degrees by the change in market sentiment. Bars, shapes and plates remain unchanged, barring exceptional instances where slight concessions have been reported on the first-named product. Sheets, however, are again on a double price basis, the quotations of a number of independents being $2 a ton below those of the Steel Corporation subsidiary. Both hot and cold-rolled strip steel are weaker and 2.90c., base Pittsburgh, on the former and 4.75c., base Pittsburgh, on the latter, now represent the maximum going prices. Bolt and nut discounts lack strength, and wire products, although unchanged as to price, are disappointingly inactive. Among the primary materials both scrap and pig iron are weak.

Whatever change may, or may not, have occurred in the attitude of the average buyer, the actual current obligations on the books of mills rolling the heavier finished products are heavy. The Illinois Steel Co. has blown in its twelfth furnace at Gary and now has 25 stacks in blast out of a total of 27. Its steel output continues at the rate of 95 per cent of ingot capacity. The operations of the Inland Steel Co. likewise are as full as mechanical conditions permit.

Pig Iron.—The market, although still very quiet, has developed the fact that concessions will bring out some business. The leading merchant continues to adhere firmly to $24.50, base furnace, but enough tonnage has moved at 50c. less to warrant recognition of $24, base furnace, as a going market quotation. Limited tonnages shipped by barge and rail from the South continue to be sold at delivered prices here, which are practically on a parity with those from Northern furnaces. At the same time, prices on Southern foundry for all rail shipment have weakened. A leading Tennessee furnace is circularizing the trade with a price of $22.50, base Birmingham, and the top of the Southern market now appears to be $23. A Michigan melter has bought a carload of 12 per cent Bessemer ferrosilicon from a blast furnace at $1 below the market, but late reports indicate that the entire Jackson County schedule on silveries and ferrosilicon has been reduced $1 by at least one producer. A Milwaukee melter has closed for several hundred tons of Bessemer and low silicon low phosphorus. Most sales during the week were relatively small, few, if any, of them exceeding 1000 tons. A local melter is inquiring for 750 tons of high silicon foundry, part for immediate delivery and the remainder for second quarter. Another Chicago user wants 600 tons of foundry for second quarter.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnaces and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards or, when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$29.15
Northern coke, No. 1, sil. 2.25 to 2.75	$24.50 to 25.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	24.00 to 24.50
Malleable, not over 2.25 sil.	24.00 to 24.50
Basic	24.00 to 24.50
High phosphorus	24.50
Southern No. 2	28.51 to 29.01
Low phos., sil. 1 to 2 per cent, copper free	33.00 to 34.00
Silvery, sil. 8 per cent	38.29
Electric ferrosilicon, 14 to 16 per cent	45.42

Ferroalloys.—Several sales of spiegeleisen during the week exceeded 100 tons and sales in this district aggregated from 1500 to 2000 tons. Most of this business was closed at approximately $35, f.o.b. New Orleans. A Wisconsin melter purchased a carload of ferromanganese at $107.50, New Orleans.

We quote 80 per cent ferromanganese, $115.06, delivered; 50 per cent ferrosilicon, $75, delivered; spiegeleisen, 18 to 22 per cent, $42.56 to $48.58, delivered.

Plates.—Demand for plates continues to lag, although local mill operations, taken as a whole, are at an unusually high rate. Plate capacity is not being pushed for output. One large plate mill, in fact, is idle. Recent railroad car orders, however, are counted on for considerable tonnage not only in plates, but also in bars and structural shapes.

The mill quotation is 2.60c., Chicago. Jobbers quote 3.30c. for plates out of stock.

Bars.—Bookings in soft steel bars are heavier than in other finished products, and prices are generally steady, although slight concessions have been developed in a few instances by inquiries involving attractive tonnage and specifications. Automobile production, while still at a high rate, is said to be endangered by the disappointing volume of car sale. At any rate, automotive interests are limiting their purchases to material for early shipment. Generally speaking, actual bar consumption in all lines, as reflected in orders passed to entry at the mills, has not yet been adversely affected, specifications and new business being practically equal to the average since the first of the year. Demand for bar iron shows little, if any, improvement and mills find it difficult to maintain single turn operations. The situation in rail steel bars is somewhat more favorable, one producer being on double time and another going over to that basis today. Fence post buying is developing in good volume and a considerable tonnage is being rolled for reinforcing purposes and for the bed and implement makers.

Mill prices are: Mild steel bars, 2.50c., Chicago; common bar iron, 2.40c., Chicago; rail steel, 2.30c., Chicago mill.

Jobbers quote 3.20c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting are 4c. for rounds and 4.50c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.75c. to 3c. base; hoops, 4.45c.; bands, 3.95c.

Bolts and Nuts.—Contracting for second quarter is proceeding slowly and current orders are light. The schedule of discounts based on 60 and 5 off for large machine bolts has entirely disappeared and the market is not any too steady at 60 and 10 off. Jobbers continue to buy from hand to mouth, and while specifications from the automobile industry indicate a high rate of output, it is now believed that output for the year will fall short of the record made in 1923. Farm implement makers, however, still hope to show a gain over last year, although not so pronounced an improvement as they looked for earlier. Implement dealers, it appears, are severely limiting their purchases, being unwilling to assume the risk of carrying stocks in any quantity. In view of this situation, some observers

predict a shortage of agricultural equipment when the farmers commence to buy their requirements.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.95c.; machine bolts up to ⅞ x 4 in., 55 and 5 per cent off; larger sizes, 55 and 5 off; carriage bolts up to ⅞ x 6 in., 50 and 5 off; larger sizes, 50 and 5 off; hot pressed nuts, squares and hexagons, tapped, $3.50 off; blank nuts, $3.50 off; coach or lag screws, gimlet points, square heads, 60 and 5 per cent off.

Cast Iron Pipe.—The market shows little change with respect either to buying or prices. The United States Cast Iron Pipe & Foundry Co. has booked 2200 tons for Montgomery County, Ohio. Another large pipe maker has practically closed a contract for 1700 tons for Berkeley, Mich. The city engineer of Milwaukee is preparing estimates for 6300 feet of 54-in. and will probably ask for tenders early in April. Detroit contemplates entering the market for 20,000 tons. Litchfield, Ill., takes bids March 26 on 300 to 400 tons. Springfield, Ill., received bids yesterday on 100 tons. The South Park Commissioners, Chicago, have placed 800 tons with the United States company.

We quote per net ton, f.o.b. Chicago.; as follows: Water pipe, 4-in., $60.20 to $62.20; 6-in. to 10-in., inclusive, $56.20 to $58.20; 12-in. and above, $55.70 to $56.20; class A and gas pipe, $5 extra.

Wire Products.—The disappointing volume of current demand is a matter of comment. Bad weather conditions are blamed for the light specifications from jobbers, and a revival in buying is hoped for with the belated advent of milder temperatures. On the other hand, demand from manufacturing consumers, which has been unusually steady, has also fallen off. A source of encouragement is found in liberal orders for nails from railroads and car builders. The operations of the leading mill average 75 per cent.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, $3.90 per 100 lb.; extra for black annealed wire, 15c. per 100 lb.; common wire nails, 3.65c. to 3.80c. per 100 lb.; cement coated nails, 3.10c. to 3.25c. per keg.

Sheets.—Local mills are still in a favorable situation as regards specifications and new business and in some instances are being pressed for shipments. Orders for sheets for roofing purposes have been better during the past two months than for several years. Buying by the automobile industry has declined, but this is explained by the fact that it had previously contracted ahead, particularly in body sheets. Taking the country as a whole, however, it is undeniable that prices are weaker, concessions of $2 a ton below the Steel Corporation prices now being so frequent as to warrant recognition as going market quotations. Two orders for light black sheets for Japan, involving from 1000 to 2000 tons each, were placed with mills east of here at sharp concessions.

Mill quotations are 3.75c. to 3.85c. for No. 28 black, 2.90c. to 3c. for No. 10 blue annealed and 4.90c. to 5c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote f.o.b. Chicago: 4c. for blue annealed; 4.70c. for black and 5.60c. for galvanized.

Rails and Track Supplies.—New business booked by local mills has been confined to miscellaneous orders, aggregating 10,000 kegs of spikes, 8000 kegs of bolts, 5000 tons of tie plates and 4500 tons of angle bars.

Standard Bessemer and open-hearth rails, $43; light rails, rolled from billets, 2.25c., f.o.b. makers' mills.

Standard railroad spikes, 3.10c. mill; track bolts with square nuts, 4.10c. mill; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.75c. base, and track bolts, 4.75c. base.

Structural Material.—Fabricating awards have taken a sharp drop, most of the lettings of the week having been small ones. The trade is encouraged, however, by the large amount of work pending and the continual appearance of new prospects. A 20-story garage and office building to be built here involves 6000 tons. Two local projects which are being figured under cover involve 5500 tons and 4000 tons respectively. Admittedly some of the construction projected may not materialize. In fact, architects report that clients are less certain about going ahead with their undertakings than was the case a few months ago, on account of both the unsettling effect of the political revelations at Washington and discord in the ranks of union labor. The latter consideration, however, is already being discounted in view of pressure which is being brought to bear on local unions by National officers of the American Federation of Labor. Notwithstanding these evidences of increased caution, a large amount of work has proceeded so far that postponement is now unlikely. Bids on the general contract for the New Palmer House, Chicago, requiring 17,000 tons, were taken March 15. Inquiries have been received by the mills from local fabricators for 1500 tons for China and 700 tons for Japan. A Chicago company is figuring on poles necessary in connection with the automatic train control system required of American railroads by order of the Interstate Commerce Commission. The conversion of the railroads to the automatic system, however, will be a slow process.

The mill quotation on plain material is 2.60c., Chicago. Jobbers quote 3.30c. for plain material out of warehouse.

Reinforcing Bars.—Lettings have been fewer, although one of them, the Duluth Hotel, involves 1000 tons. Prospective business continues to develop in large volume and a considerable tonnage is on the point of closing. Local warehouse prices continue to range from 2.75 to 3c. Lettings include:

Duluth Hotel, Duluth, Minn., 1000 tons to American System of Reinforcing.

Missouri, Kansas & Texas warehouse, Dallas, Tex., detailing to be done by Concrete Engineering Co., 950 tons of rail steel divided between La Clede Steel Co. and Kansas City Bolt & Nut Co.

Rock Island Lines, 100 tons for Silvis, Ill., to Truscon Steel Co.

Ten-story apartment hotel for Albert Hartz, Detroit, 200 tons to McRae Steel Co.

Pending work includes:

National Biscuit Co., cracker bakery, Lexington Street and Maplewood Avenue, Chicago, 200 tons.

Warshawsky Auto Parts Co., warehouse, Chicago, 300 tons, Alfred S. Alschuler, architect.

Apartment building, Sheridan Road and Brompton Street, Chicago, 1000 tons.

Motley School, Minneapolis, 150 tons.

Michael Dowling School, Minneapolis, 100 tons.

Ford Motor Co. plant, St. Paul, 300 tons.

Old Material.—A steel works purchased heavy melting last week at $17 delivered and is now offering $16. Consumer buying is at a low ebb and with prices steadily declining, scrap offerings are increasing. At the same time, it is recognized, that if the market goes too low, a considerable quantity of scrap at outlying points will be shut out of Chicago. Railroad lists include the Rock Island, 5300 tons; the Chesapeake & Ohio, 10,000 tons, and the Monon, 500 tons. Through a typographical error shoveling steel was incorrectly quoted last week; it should have carried a price of $16.75 to $17.25.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$19.50 to $20.00
Cast iron car wheels	20.50 to 21.00
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	27.00 to 32.00
Forged steel car wheels	19.25 to 19.75
Railroad tires, charging box size	19.50 to 20.00
Railroad leaf springs, cut apart	19.50 to 20.00
Rails for rerolling	19.00 to 19.50
Steel rails, less than 3 ft.	20.00 to 20.50
Heavy melting steel	16.25 to 16.75
Frogs, switches and guards cut apart	17.50 to 18.00
Shoveling steel	15.75 to 16.25
Drop forge flashings	13.00 to 13.50
Hydraulic compressed sheets	13.50 to 14.00
Axle turnings	14.50 to 15.00
Steel angle bars	18.50 to 19.00
Steel knuckles and couplers	19.50 to 20.00
Coil springs	20.50 to 21.00
Low phos. punchings	17.00 to 17.50
Machine shop turnings	11.00 to 11.50
Cast borings	14.00 to 14.50
Short shoveling turnings	14.00 to 14.50
Railroad malleable	21.00 to 21.50
Agricultural malleable	20.00 to 20.50
Per Net Ton	
Iron angle and splice bars	19.00 to 19.50
Iron arch bars and transoms	19.00 to 19.50
Iron car axles	27.50 to 28.00
Steel car axles	19.00 to 19.50
No. 1 busheling	12.50 to 13.00
No. 2 busheling	9.50 to 10.00
Cut forge	14.50 to 15.00
Pipes and flues	11.00 to 11.50
No. 1 railroad wrought	13.75 to 14.25
No. 2 railroad wrought	14.50 to 15.00
No. 1 machinery cast	20.00 to 20.50
No. 1 railroad cast	19.00 to 19.50
No. 1 agricultural cast	19.00 to 19.50
Locomotive tires, smooth	17.00 to 17.50
Stove plate	16.50 to 17.00
Grate bars	15.50 to 16.00
Brake shoes	16.25 to 16.75

New York

Active Inquiry for Cars—Pig Iron Dull—Scrap Prices Decline

NEW YORK, March 18.—On the limited tonnages of pig iron sold in the past week, buyers of more than carload lots have had little difficulty in getting low prices. A purchase by the New York Air Brake Co. of 4000 tons is understood to have gone at a low price to a New York State furnace outside of the Buffalo district. The Gould Coupler Co. purchased 3000 tons, about half of the tonnage for which it was inquiring. Other sales of fair size were one for 1000 tons, one for 2000 tons, and one for 3000 tons. The tonnage pending now probably amounts to 4000 or 5000. Eastern Pennsylvania and Buffalo irons are not far from the same price, furnace, when active competition develops. Buffalo quotations range from $21.50 to $22, No. 2 plain. The usual minimum in eastern Pennsylvania is $22, with higher prices paid for carload lots. Shipments are going forward satisfactorily.

We quote delivered in the New York district as follows, having added to furnace price $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 1X fdy., sil. 2.75 to 3.25	$25.27 to $25.77
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	24.77 to 25.27
East. Pa. No. 2, sil. 1.75 to 2.25	24.27 to 24.77
Buffalo, sil. 1.75 to 2.25	26.41 to 26.91
No. 2X Virginia, sil. 2.25 to 2.75	31.44
No. 2 Virginia, sil. 1.75 to 2.25	30.44

Ferroalloys.—There is very little demand for ferromanganese, which is still quoted by both domestic and English producers at $107.50, furnace or seaboard. There are continued reports of German ferromanganese offered at $105, seaboard. Spiegeleisen is nominally quoted by domestic producers at $38 to $40, furnace, but the foreign product is offered at slightly less. Ferrosilicon, 50 per cent, is nominal at $75, the contract price, at which nearly all consumers covered.

Cast-Iron Water Pipe.—Demand from private sources continues active, but municipal tenders are as yet not numerous. About 1000 tons of 30-in. water pipe and accessories involved in the contract let by the Department of Water Supply, Gas and Electricity, New York, has been placed with the Warren Foundry & Pipe Co. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $61.60 to $63.60; 4-in. and 5-in., $66.60 to $68.60; 3-in., $76.60 to $78.60, with $5 additional for Class A and gas pipe. Makers of soil pipe are shipping on contracts, but buying is light and is expected to continue so until spring construction has become more active. We quote discounts of both Southern and Northern makers, f.o.b. New York, as follows: 6-in., 29½ to 30¾ per cent off list; heavy, 39½ to 40¾ per cent off list.

Warehouse Business.—While the volume of business is fairly large, orders are, as a rule, for small tonnages. Demand for structural steel continues, but buying is reported lighter this month than in March, 1923. This decline is attributed to the mild weather experienced in January and February, which resulted in purchasing during these months that would otherwise have been held over until March. Prices generally are firm. Black and galvanized sheets are still held at the 4.85c. per lb. base on black and 5.85c. per lb. base on galvanized, shading seldom exceeding 5c. per 100 lb. On some of the higher grades of steel, stocks of jobbers are evidently running low and purchases of special sizes usually carried in stock are noted between warehouses. Consumers and sellers are evidently determined to operate on as small stocks as possible, so as not to be overstocked should there be a decline in price. Prices of brass and copper products show a slight advance. We quote prices on page 920.

Finished Iron and Steel.—In the face of much lighter demand for most lines of finished steel there has been a fresh spurt of structural steel buying and further inquiry and placing of orders for cars and locomotives in the past week. The Louisville & Nashville has ordered 3900 cars, the Southern Railway, 2000, the Norfolk & Western has contracted for the repair of 1000 cars and the Chesapeake & Ohio has issued an inquiry for 5000 cars. Twenty-five locomotives have been ordered and 46 are inquired for. Superficial indications have pointed to some slackening of building work in New York and vicinity, but actual lettings show a fair degree of activity. Jobs in New York and immediate vicinity closed during the week total more than 4000 tons, while new projects call for a total of nearly 17,000, including 4000 tons for main buildings of the Western Electric Co.'s new plant at Kearny, N. J. Six school buildings, on which bids close April 8, call for about 7500 tons of steel. An interesting inquiry for plates comes from the Standard Oil Co. of New Jersey, which wants 3800 tons of still-bottom steel, most of which is to be 2 in. in thickness and more than 100 in. wide. These plates take a $10 extra for quality, in addition to the regular extra for width, so that keen competition for the business is probable, though only a few mills can roll this width and thickness. Prices of plates, shapes and bars continue to show weakness. The more attractive orders for plates are now taken in some instances at 2.25c., Pittsburgh, while car builders, who covered on tank material early in the year at 2.20c. and 2.25c., Pittsburgh, expect to buy pending tonnage at less than 2.20c. In structural shapes the price situation is less well defined, each job being more or less a law unto itself, but 2.30c., Pittsburgh, has been quoted and 2.35c., Pittsburgh, appears to be the top of the market on anything from a carload upward. Bar tonnages are being taken at 2.30c. to 2.40c., Pittsburgh, depending on the customer and the character and size of the rolling. Concessions are offered in sheets, usually about $2 a ton, but pipe, tin plate, wire and nails and other products appear to be fairly firm.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.69c. to 2.74c.; plates, 2.64c. to 2.74c.; structural shapes, 2.69c. to 2.74c.; bar iron, 2.74.

Coke.—Prices continue firm and demand active. Standard foundry is unchanged at $5.25 to $5.75 per ton and standard furnace at $4 to $4.50 per ton. By-product is at $10.91, Newark and Jersey City, N. J.

Old Material.—A large part of the present activity in the market is evidently transactions between brokers and dealers, an effort being made to fill old orders as rapidly as possible in view of probable cancellation by the consumer, who can now purchase at lower prices. Heavy melting steel is being purchased at $15.50 to $16 per ton delivered eastern Pennsylvania, and in some instances slightly higher prices are reported to have been paid by brokers wishing to complete shipment on a higher priced order. On most grades the market is off another 50c. to $1 per ton this week. Specification pipe is being bought at $14.50 to $15 per ton delivered eastern Pennsylvania. Some stove plate is being shipped to Phoenixville and a few shipments are being made to a New Jersey consumer. A fair estimate of the buying prices, New York, is $12.50 to $13.50, the former being for eastern Pennsylvania shipment, the latter for delivery to New Jersey consumers taking a freight rate of $2.02. Machine shop turnings are bringing $14 to $14.50 per ton, delivered, and about the same range is paid on borings and turnings and cast borings, delivered to eastern Pennsylvania consumers.

Buying prices per gross ton New York follow:

Heavy melting steel, yard	$12.00 to $12.50
Steel rails, short lengths, or equivalent	12.75 to 13.25
Rails for rolling	17.00 to 17.50
Relaying rails, nominal	25.00 to 26.00
Steel car axles	18.00 to 19.00
Iron car axles	25.00 to 26.00
No. 1 railroad wrought	16.00 to 16.50
Forge fire	11.00 to 11.50
No. 1 yard wrought, long	15.00 to 15.50
Cast borings (clean)	10.75 to 11.25
Machine-shop turnings	10.75 to 11.25
Mixed borings and turnings	10.75 to 11.25
Iron and steel pipe (1 in. diam., not under 2 ft. long)	11.00 to 11.50
Stove plate	12.50 to 13.50
Locomotive grate bars	12.00 to 12.50
Malleable cast (railroad)	14.00 to 15.00
Cast iron car wheels	16.00 to 16.50

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$19.50 to $20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	18.50 to 19.00
No. 1 heavy cast, not cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	16.50 to 17.00

Buffalo

Buyers Cautious in Buying Pig Iron—Price Cutting on Bolts

BUFFALO, March 18.—The inquiry before the pig iron market for the week ranged between 10,000 and 15,000 tons. Included in this total was one for 5000 tons of foundry put out by the New York Air Brake Co. This iron was placed. It is reported to have gone to a furnace outside Buffalo at a price which carries a much lower freight rate than Buffalo. The Gould Coupler Works, which inquired last week for 2000 to 5000 tons of basic and 1000 to 3000 tons of malleable, bought 2000 tons of basic and 1000 of malleable. A part of this iron was placed with a local furnace. Other inquiries this week included one for 3000 tons of foundry from the West and two for 1000 tons of foundry. The Pennsylvania Railroad placed 5000 in eastern Pennsylvania, as reported in THE IRON AGE. The going price is $22 for No. 2 plain, with this price having been done occasionally on No. 2, 2.25 to 2.75 silicon. The differentials are being obtained. some furnaces report, but the $23 base has disappeared from the market. On round tonnages it is thought makers might consider lower than $22. Sales for the week were comparatively light.

We quote f.o.b., gross ton, Buffalo, as follows:

No. 1 foundry, sil. 2.75 to 3.25	$22.50 to $23.00
No. 2 foundry, sil. 2.25 to 2.75	22.00 to 22.50
No. 2 plain, sil. 1.75 to 2.25	21.50 to 22.00
Basic	21.50 to 22.00
Malleable	21.50 to 22.00
Lake Superior charcoal	29.28

Finished Iron and Steel.—Structural shapes are more active and fabricators are being kept busy estimating contracts. The volume of these indicates a heavy spring building business. The week has seen some good lettings and a particularly good total of those small jobs which range from 25 to 50 tons. It now appears that the Liberty Bank Building will require closer to 5000 tons of structural steel than the 2500 tons previously reported, but accurate figures on this are lacking locally. Shape prices are quoted from 2.40c. to 2.50c. In fact, when the tonnage of shapes has been lumped with other material, 2.40c. is reported to have been shaded. Smaller Eastern mills are giving Buffalo mills very stiff competition on both shapes and plates. Little demand exists for the latter. Bars appear to be holding well to 2.40c. Sheet business continues good, one contract for 600 to 700 tons of black having been closed. The prices on black are from 3.75c. to 3.85c. and on galvanized from 4.90c. to 5c. Pipe demand is just as strong as ever, the bulk being for buttweld sizes. Most of the mills are sold ahead two months on buttweld sizes, sales agencies report. Pipe jobbers are apparently building up good stocks. Plate and shape mills on this side expect to get some of the business following the award by the Canadian National Railways to the National Steel Car Corporation, Hamilton, Ont., of 600 cars. Cold-rolled business has improved with automobile parts makers and washing machine makers specifying better. The bolt market is not strong. Discounts of 60, 10 and 5 can be done on cut thread machine bolts and possibly this price might be bettered on a large quantity.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.65c.; plates, 3.65c.; soft steel bars, 3.55c.; hoops, 4.65c.; bands, 4.35c.; blue annealed sheets, No. 10 gage, 4.30c.; galvanized steel sheets, No. 28 gage, 6.10c.; black sheets, No. 28 gage, 5c.; cold rolled round shafting, 4.45c.

Old Material.—The market shows little change from last week, except that some dealers see what they interpret to be a better tone. Buying is very desultory and mostly hand-to-mouth variety. The heavy melting steel trading shows a rather wide divergence of prices. One local mill is said to be paying $16.50 to $17 for its small lots, while another is offering $18. Still another price is that of $19 reported to be offered by dealers who may possibly be trying to fill old orders. The various grades of steel works scrap are undoubtedly weaker, including busheling, which is off 50c. to $15 to $15.50; stove plate being quoted at $16.50 to $17 and hydraulic compressed sheets at $17.50 to 18.50. Blast furnace scrap has sold for $14.25 during the week, though one dealer states he is able to buy this scrap in sizable quantities for from $12.50 to $13. A sale of flashings and similar light material has been made around $15.50 to $15.75.

We quote f.o.b., gross ton, Buffalo, as follows:

Heavy melting steel	$17.50 to $18.50
Low phos., 0.04 and under	22.00 to 23.00
No. 1 railroad wrought	16.00 to 17.00
Car wheels	20.50 to 21.00
Machine shop turnings	12.50 to 13.00
Cast iron borings	14.00 to 14.50
No. 1 busheling	15.00 to 15.50
Stove plate	16.50 to 17.00
Grate bars	17.50 to 18.00
Bundled sheet stampings	14.00 to 14.50
Hydraulic compressed	17.50 to 18.50
Railroad malleable	22.00 to 23.00
No. 1 machinery cast	20.00 to 20.50

Birmingham

Very Few Sales of Pig Iron—Heavy Production and Shipments

BIRMINGHAM, ALA., March 18.—The Southern pig iron market is slow. The new business is in small lots, which are not numerous. However, furnace interests are not perturbed, but believe that consumers are holding off in the hope of concessions ere long. Delivery of pig iron on old contracts is active, production is being maintained and a little iron is still being taken from the surplus stock on the yards. Quotations remain firm, ranging from $23 to $24 per ton, the smaller the lot the higher the price. Soil pipe makers are among those buying in small lots again. A week or two ago this interest was buying in a greater quantity. Stove makers are not buying beyond a month though prospects are that on the opening of spring there will be need for greater production.

We quote per gross ton f.o.b. Birmingham district furnace as follows:

Foundry, silicon 1.75 to 2.25	$23.00
Basic	23.00
Charcoal, warm blast	33.00

Cast Iron Pipe.—A slight reduction in the inquiry for cast iron pipe is reported, but this is accounted for in the inability of some customers to get delivery. The majority of the manufacturers, it is authoritatively announced, are booked 30 to 90 days ahead now on the smaller sizes of pipe. Pipe quotations show no change, class B pipe ranging from $48 for 6-in. and over, Birmingham, to $52 for the 4-in., Birmingham. The American Cast Iron Pipe Co. announces taking contracts from three Michigan cities, 151 tons from Pontiac, 304 tons from Jackson and 772 tons from Flint. An order for 120 tons from Port Arthur, Tex., is also announced. The soil pipe and fittings trade is picking up as spring approaches and building operations are steady. Local plants are well supplied with business which promises to carry the active operations through June. Quotations for standard sanitary pipe are on a $60 per ton base. The more optimistic continue predicting $5 advance in near future. Actual reconstruction of Central Foundry Co. pipe shop at Anniston, recently destroyed by fire, is under way. Birmingham Machine & Foundry Co. soil pipe shops are filling orders from California.

We quote: 4-in. water, $51 to $52; 6-in., $47 to $48; 4-in. gas, $56 to $57; 6-in., $52 to $53; standard soil pipe, $60; heavy gage, $45.

Finished Material.—Slight depression is noted in certain shapes of steel and Gulf States Steel Co. has one fewer open-hearth furnaces in operation. Some wire and nails have accumulated in warehouses. The general steel market in this section is good. Several departments in Ensley mill will show record outputs for the month, if unforeseen accident does not happen. In addition to the steel which will be required for 1800 freight cars to be built by Tennessee Coal, Iron & Railroad Co. at Fairfield Works for the Louisville & Nashville Railroad, other orders for cars are in hand. Several weeks will pass before actual construction on the open-hearth furnaces and sheet mill announced by the Tennessee Coal, Iron & Railroad Co. for Fairfield, will be started. Steel bars are quoted 2.50c., Birmingham.

Coke.—The coke market shows very little revival, some accumulation being noted. Coke prices are still as low as $5 for by-product foundry and as high as $6.50. An independent coke company, one making coke for the open market, reports a number of sales, but margin of profit very close.

Scrap Iron and Steel.—Better feeling is noted in the scrap market in the Birmingham district though no new business of consequence is announced. Quotations are the same as for the past few weeks.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Cast iron borings, chemical		$16.00
Heavy melting steel		$14.00
Railroad wrought	12.00 to	13.00
Steel axles	19.00 to	20.00
Iron axles		20.00
Steel rails	12.00 to	13.00
No. 1 cast		20.00
Tram car wheels	18.00 to	19.00
Car wheels	13.00 to	14.00
Stove plate		15.50
Machine shop turnings		7.00
Cast iron borings		9.00
Rails for rolling	16.00 to	16.50

St. Louis

Some Pig Iron Melters Show More Interest in Market, but Buy Little

ST. LOUIS, March 18.—Buying of pig iron is only fair, but there are signs of activity. For instance, an East Side melter has let it be known that it would buy 10,000 tons of basic iron now for delivery within the next two or three months, if the price is right. A Kentucky car wheel manufacturer also is in the market for 300 to 400 tons of wheel and foundry iron, but most other inquiries are for carloads up to 100 tons. The St. Louis Coke & Iron Co. reports the sale of 500 tons of foundry iron to a car wheel manufacturer in Illinois. This maker also reports that anticipations of shipments against contracts continue heavy. A West Side melter has several thousand tons of basic and an Illinois engine builder has bought 300 tons of foundry iron from Chicago makers. The market is unchanged. The foundry being erected by Haynes & Langenberg Furnace Co. for the making of its own castings soon will be in operation.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Birmingham (rail and water), $5.17 from Birmingham, all rail and 81 cents average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25		$26.66
Northern malleable, sil. 1.75 to 2.25		26.66
Basic		26.66
Southern fdy., sil. 1.75 to 2.25 (rail)	$28.67 to	29.17
Southern foundry, sil. 1.75 to 2.25 (rail and water)	27.08 to	27.28
Granite City iron, sil. 1.75 to 2.25	26.31 to	26.81

Finished Iron and Steel.—Activity among railroads centering here is shown by requests to push deliveries of rails and track spikes already ordered. Warehouses also are calling for shipments of track spikes. Material called for in new railroad inquiries is small. Jobbers in the Southwestern territory served are making inquiries for structural steel and sheets. The smaller fabricators in the territory also are buying, but lightly. A St. Louis car manufacturer has bought 800 wheels for cars for a Western city.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold-rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 4.70c.; structural rivets, 4.15c.; boiler rivets, 4.35c.; tank rivets, ⅞-in. and smaller, 50-5 per cent off list; machine bolts, 45-5 per cent; carriage bolts, 40-5 per cent; lag screws, 50-5 per cent; hot pressed nuts, squares or hexagons blank, $2.50, and tapped, $2.50 off list.

Coke.—Representatives of Eastern ovens have sought to interest buyers here in coke through statements that if they did not buy at once they would be too late, as the ovens were about to be oversold. But users here unheeded this call. Buying is light. As for domestic coke, it is almost a dead issue.

Old Material.—The market for old material is still feeling the effects of the unwillingness of consumers to take on any considerable tonnages and the disposition of the railroads to heavily dump material on the market, and is, therefore, soft. However, prices are unchanged. The steel rolling mills are holding out more persistently than any other class in an effort to break the market. Iron rolling mills are buying a few specialties, as are gray iron foundries. New railroad lists during the week include the following: Wabash, 3000 tons; Missouri-Kansas-Texas, 2000 tons; Rock Island, 5500 tons, and Mobile & Ohio, 225 tons.

Iron rails	$17.00 to	$17.50
Rails for rolling	19.00 to	20.00
Steel rails, less than 3 ft.	20.00 to	20.00
Relaying rails, 60 lb. and under	25.00 to	26.00
Relaying rails, 70 and over	32.50 to	33.00
Cast iron car wheels	21.00 to	21.00
Heavy melting steel	17.00 to	17.50
Heavy shoveling steel	16.00 to	16.00
Frogs, switches and guards cut apart	18.50 to	19.00
Railroad springs	21.00 to	22.00
Heavy axles and tire turnings	14.00 to	14.00
Per Net Ton		
Steel angle bars	16.50 to	17.00
Steel car axles	20.50 to	21.00
Iron car axles	27.50 to	28.00
Wrought iron bars and transoms	21.50 to	22.00
No. 1 railroad wrought	15.00 to	15.00
No. 2 railroad wrought	15.00 to	15.00
Cast iron borings	11.00 to	11.50
No. 1 busheling	15.00 to	15.00
No. 1 railroad cast	19.00 to	20.00
No. 1 machinery cast	19.50 to	20.00
Railroad malleable	17.00 to	17.00
Machine shop turnings	10.50 to	11.00
Champion bundled sheets	10.50 to	11.00

Cincinnati

Pig Iron Market Dull and Quotations Are Untested

CINCINNATI, March 18.—The pig iron market was exceptionally quiet during the past week, the largest sale reported being 300 tons of Northern iron to a melter in Louisville. This was a resale tonnage and went at $23.50, Ironton, base. It is still possible to buy iron direct from southern Ohio furnaces at this price, but on carload lots $24 is the usual figure. A sale of 1000 tons of resale Tennessee iron was made Monday to a Kentucky melter on the basis of $22.50, Birmingham. Tennessee iron can be had direct at $22.50, but the lowest price in Birmingham district is $23, with several furnaces asking $24. Carload sales of silvery and charcoal irons at the regular schedules were reported. We note a sale of 1000 tons of Northern basic to a northern Ohio melter at $22, Valley furnace. An inquiry for 1000 to 2000 tons of foundry and malleable grades from Lima is expected to be a test of the various markets.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$26.55 to	$27.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	27.05 to	27.55
Ohio silvery, 8 per cent		35.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	25.77 to	26.27
Basic Northern		25.27
Malleable	25.77 to	26.27

Sheets.—Several mills are now regularly quoting 3.75c. for black sheets and 4.90 on galvanized, but 3c. appears to be the minimum on blue annealed. Roofing sheets, although in good demand, are weak, and concessions of $3 per ton are reported. The majority of the sales, however, are still being made at 3.85c. and 5c. for black and galvanized. Demand on the whole is considered fair, though second quarter contracts are not being received in large numbers.

Reinforcing Bars.—Current and prospective demand is satisfactory. A number of projects, involving considerable tonnages, will shortly be up for figures. These include the Alms Hotel, Cincinnati; waterworks reservoir, Cincinnati; Starks Co. addition, Louisville, Ky.; American Insurance Union, office building, Columbus, and road work in Indiana and Ohio. Current inquiries include 300 tons for the Starling Loving Hospital at Columbus. Bourne-Fuller Co. has taken several hundred tons for an addition to the W. B. Oglesby Paper Co. at Middletown, Ohio. Prices are fairly firm, 2.10c. to 2.30c. being quoted on hard steel, and 2.30c. to 2.40c. on new steel.

Structural Activity.—Bids will be taken March 24

on the second unit of the Lunkenheimer Co.'s plant at Hartwell, Cincinnati. This unit will involve 650 tons of steel. The municipal building at Bluefield, W. Va., will require 350 tons, and the general contract has been awarded to H. A. Lucas, Bluefield. The Union Bank building at Huntington, 650 tons, has been awarded on general contract to G. A. Fuller Co., and it is reported that the steel has been awarded to a Cleveland fabricator. A number of small awards have been made, but as a general thing activity is limited.

Tool Steel.—The month to date has been the best since last summer. While orders generally are small, they are numerous. Prices are firm, high speed steel being quoted at 75c. to 95c. per lb. according to brand.

Warehouse Business.—Local jobbers report a constant y increasing demand for steel, and this month will far exceed February in volume of orders. Prices are unchanged.

Cincinnati jobbers quote: Iron and steel bars, 3.50c.; reinforcing bars, 3.60c.; hoops, 4.55c.; bands, 4.25c.; shapes, 3.60c.; plates, 3.60c.; cold-rolled rounds, 4.25c.; cold-rolled flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, 4.80c.; No. 28 galvanized sheets, 5.85c.; No. 9 annealed wire, $3.60 per 100 lb.; common wire nails, $3.50 per keg base; cement coated nails, $3.30 per keg.

Finished Material.—Orders continue to come in at a fair rate, but are mostly for small tonnages for early shipment. There has been little contracting for second quarter. Bars are in fair demand, and there are no evidences of price cutting in this district. Cold-finished materials are also in fair demand, and 3c., Pittsburgh, appears to be the regular quotation, although mills generally are equalizing Chicago rates. It is reported that an independent mill is quoting 2.40c. on shapes, and that it has taken some fair-sized orders at this figure. The regular market on plates appears to be 2.40c., although one or two companies are still making sales at 2.50c. Demand is light.

Fluorspar.—Sales of domestic fluorspar are very light, as foreign producers are reported to be selling considerably below domestic prices. However, a few carload lots were disposed of, and an inquiry for 500 tons is current. The larger producers are holding prices, but a number of the smaller ones are making substantial concessions on current business. The range of prices is from $19 to $22 on 80 per cent and over calcium and under 5 silica, and $22 to $23.50 on 85 and 5 per cent respectively. See page 903.

Coke.—The coke market is very quiet, and prices are inclined to weaken under the lack of demand. New River foundry coke can be bought at $10.50, and Wise County foundry at $5.25. It is reported that Wise County furnace coke has been sold well below $4.50, but this price has evidently been withdrawn. There is no change in Connellsville or by-product prices.

Connellsville furnace, $4.15; foundry, $5; New River foundry, $10.50; Wise County furnace, $4.25; foundry, $5.25; by-product foundry, $8, Connellsville basis.

Old Material.—There was little trading in scrap, but what was done was at lower prices than last week. Steel mills in this district are well covered, but intimate they would consider bargain offers. Foundry grades are also very dull. Prices, though largely nominal, are at least 50c. lower than last week.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton	
Heavy melting steel	$15.50 to $16.00
Scrap rails for melting	15.00 to 15.50
Short rails	19.50 to 20.00
Relaying rails	29.50 to 30.00
Rails for rolling	17.00 to 17.50
Old car wheels	14.50 to 15.00
No. 1 locomotive tires	15.50 to 16.00
Railroad malleable	17.50 to 18.00
Agricultural malleable	16.50 to 17.00
Loose sheet clippings	10.00 to 10.50
Champion bundled sheets	12.00 to 12.50
Per Net Ton	
Cast iron borings	10.50 to 11.00
Machine shop turnings	9.50 to 10.00
No. 1 machinery cast	19.50 to 20.00
No. 1 railroad cast	16.00 to 16.50
Iron axles	22.50 to 23.00
No. 1 railroad wrought	12.00 to 12.50
Pipes and flues	9.00 to 9.50
No. 1 busheling	10.50 to 11.00
Mixed busheling	8.50 to 9.00
Burnt cast	11.50 to 12.00
Stove plate	11.50 to 12.00
Brake shoes	12.50 to 13.00

Boston

Pig Iron Market Quiet and Uncertain—Low Prices on Plates and Shapes

BOSTON, March 18.—The pig iron outlook is uncertain. Not enough business has been transacted since the H. B. Smith Co., Westfield, Mass., purchase of 7000 tons at price concessions to determine whether or not the market really is weaker. The Gilbert & Barker Co., West Springfield, Mass., some time ago inquired on 1000 tons of iron but apparently did not buy. The company is again inquiring on 500 tons No. 2X and an equal amount of No. 1X, deliveries to begin immediately. Brokers feel that as to the future of the market, much depends on prices submitted for this business. Although eastern Pennsylvania iron was sold the Westfield concern at concessions, furnaces maintaining a $23 furnace base have tucked in a car here and there the past week at full prices. On the other hand, Buffalo iron, if anything, is easier inasmuch as $22 is quoted more often than $23 furnace base. Because of freight rates, Virginia and Alabama furnaces are selling only occasionally small lots in this territory, but as they are for special mixture purposes, full prices are obtained. A car of New York State, silicon 3.50 to 4.00, offered a Worcester, Mass., foundry the past week at $27.40 delivered, was turned down because of a better price on other iron, the brand not being made public. Lake charcoal iron in a small way figured in recent transactions at $26 furnace base. Foreign iron is cheap as compared with domestic, but in limited demand. A New York house has 360 tons Belgian iron on Mystic Wharf, Charlestown, Boston going begging at $22.35 on dock duty paid, and Continental iron, same silicon, 2.50 to 3.00, is fully as cheap. India, silicon 1.75 to 2.25, sold within a few days at $26.65 delivered Massachusetts, April and May delivery, which figures back to $24 duty paid on dock Boston.

We quote delivered prices on the basis of the latest reported sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia and $9.60 from Alabama:

East. Penn., sil. 2.25 to 2.75	$26.15 to	$27.15
East. Penn., sil. 1.75 to 2.25	25.65 to	26.65
Buffalo, sil. 2.25 to 2.75		27.41
Buffalo, sil. 1.75 to 2.25		26.91
Virginia, sil. 2.25 to 2.75	32.42 to	33.42
Virginia, sil. 1.75 to 2.25	31.92 to	32.92
Alabama, sil. 2.25 to 2.75		33.10
Alabama, sil. 1.75 to 2.25		32.60

Warehouse Business.—Warehouse sales of iron and steel are running ahead of those for the corresponding period last month, but are not heavy. Stocks are comfortably large and well assorted.

Soft steel bars, $3.51½ per 100 lb. base; flats, $4.40; plain and deformed concrete bars, $3.76½; small angles, channels and tees, $3.51½; structural steel, large angles and beams, $3.61½; tire steel, $4.80 to $5.15; open-hearth spring steel, $5 to $8; crucible spring steel, $12; steel bands, $4.31½ to $5.20; hoop steel, $5.80 to $6.30; cold rolled steel, $4.35 to $4.85; toe calk steel, $6.15; heavy plates, $3.61½; light plates, $3.86½; diamond pattern plates, stock sizes, $5.90; blue annealed sheets, $4.51½; refined iron bars, $3.51½; best refined iron bars, $4.75; Wayne, $5.50; Norway rounds, $6.60; Norway squares and flats, $7.10.

Finished Material.—A moderate tonnage of plates has been placed in this territory recently at 2.25c. to 2.50c. Pittsburgh base, the lower price applying to 100-ton and larger lots. Shapes are available at 2.35c. Pittsburgh base, although some mills hold to 2.40c. Bars also have been offered at concessions of about $5 a ton. Low fabricating bids have been on certain work coming on the market. Levering & Garrigues are awarded 575 tons of structural steel for the Waterman building, Boston; New England Structural Co., 150 tons for a local job; and American Bridge Co. approximately 140 tons for a Springfield, Mass., bridge. Bids were submitted this week on 750 tons for a Hancock, Me., bridge and 200 tons for a Maine paper plant. The Maine Central Railroad has placed thirteen steel cars and the Staten Island Railroad 25 double-deck electric cars with the Osgood Bradley Car Co., Worcester, Mass. Of the equipment recently ordered by the New York Central Railroad the American Locomotive Co. will build four switching engines for the Boston & Albany Railroad for use at West Springfield and Allston, Mass.

Coke.—New England producers of by-product foundry coke report that specifications against first half contracts continue to show a slow and steady increase over those for the corresponding periods in January and February. Domestic coke, which early in the winter sold slowly and accumulated at ovens, is in much better demand because of weather conditions. Surplus oven stocks are fast nearing the normal basis. Good grades of Connellsville foundry coke apparently are well sold ahead. Fairly good fuel is offered at $5.75 in box cars Connellsville or $11.30 delivered New England consuming point, and at $6 in open cars, ovens, or $11.55 delivered. Less desirable coke is obtainable at $5.25 and $5.50 or $10.80 and $11.05 delivered, respectively. Quality and price considered, New England foundry coke at $12.50 delivered appeals more strongly to foundries in this territory.

Old Material.—The market is nearer a standstill than it has been in weeks. Prices are soft and to a certain extent unreliable due to a wide difference of opinion as to the value of material throughout the trade. Quotations on heavy melting steel which took an unusually wide range a week ago, apparently are further apart than ever. Some houses cannot do better than $11.50 on cars shipping point, while others quote $12, $12.50, $13 and one firm as high as $13.50. On any sizable new tonnage business it is doubtful if better than $12 to $12.50 would be paid. Certain dealers maintain $11 to $11.50 is the wrought pipe market; more of them, however, say it is $9.50 to $10. Opinions as to the values of other material are equally mixed, and unless there is new business developed will undoubtedly continue uncertain.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$22.00 to $22.50
No. 2 machinery cast	20.00 to 20.50
Stove plates	15.50 to 16.00
Railroad malleable	19.00 to 19.50

The following prices are offered per gross ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$11.50 to $13.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 yard wrought	13.00 to 13.50
Wrought pipe (1-in. in diam., over 2 ft. long)	10.00 to 10.50
Machine shop turnings	10.00 to 10.50
Cast iron borings, chemical	12.00 to 12.50
Cast iron borings, rolling mill	11.00 to 11.50
Blast furnace borings and turnings	9.50 to 10.00
Forged scrap and bundled skeleton	9.50 to 10.00
Shafting	17.00 to 17.50
Street car axles	17.00 to 17.50
Rails for rolling	13.50 to 14.00

Sharp Reductions in Detroit Old Material Prices

DETROIT, March 18.—Some further declines have been registered in the prices of old material in this district, and very few sales have been reported. Mills and furnaces are not showing any interest at present, and some further reductions are expected.

The following prices are quoted on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel	$14.50 to $15.00
Shoveling steel	14.50 to 15.00
Borings	11.50 to 12.00
Short turnings	11.50 to 12.00
Long turnings	10.50 to 11.00
No. 1 machinery cast	17.00 to 17.50
Automobile cast	24.00 to 25.00
Hydraulic compressed	13.75 to 14.25
Stove plate	14.00 to 15.00
No. 1 busheling	11.50 to 12.00
Sheet clippings	10.50 to 11.00
Flashings	11.50 to 12.00

Youngstown Scrap Market

YOUNGSTOWN, March 18.—A steel interest at Warren whose iron production is insufficient for the needs of its open-hearth furnaces has entered the scrap metals market. A recent purchase of heavy melting steel by this company involving several thousand tons was made at $21.

There is no unusual movement in this market, aside from the regular purchases by Valley independents.

Steel melters have not built up scrap stocks to any extent and regular buying from such sources, provided production is maintained, is expected by dealers.

Cleveland

Shipments and Bookings of Steel Companies About Equal—Moderate Buying

CLEVELAND, March 18.—In finished material, the volume of business continues rather light with orders largely limited to small lots. Many buyers defer placing orders as long as possible and then want very prompt shipment. However, mills are booking about as much material as they are shipping, so that there is virtually no change in the delivery situation and fairly prompt deliveries can be secured. Automobile companies have become more active factors in the market now that the second quarter is close at hand. The Ford Motor Co. has sent out an inquiry for steel bars, not indicating the tonnage required or the delivery period, but this company has recently followed the policy of purchasing for a month's requirements. The Ford company during the week placed orders for round lots of alloy steel and strip steel for April shipment. Some of the automobile parts manufacturers placed second quarter contracts for steel bars, buying in the same quantities as for the first quarter. These are making parts for low priced cars for which the demand is expected to continue heavy, but some of the automobile manufacturers are planning to curtail production schedules in the second quarter and have cut their steel requirements. The automobile industry is at present in an uncertain stage. Car builders have had their plants operating at capacity this year and are said to be from 30 to 45 days ahead of production as compared with any previous years. Consequently they have accumulated unusually large stocks to supply the heavy spring demand which is expected to develop as soon as the weather warms up. It may take several weeks to determine whether this demand comes up to expectations. Some of the bolt and nut manufacturers have curtailed orders for steel. The price situation shows little change. Steel bars are firm at 2.40c. and no shading below 2.40c. is reported in structural material. The weakness in plates continues, with 2.40c. the common quotation. Structural orders have improved. Several jobs were placed during the week aggregating 3500 tons including 1200 tons for a lift bridge in Chicago taken by the Mt. Vernon Bridge Co. for which the Carnegie Steel Co. will supply the steel. Active inquiries are pending for three lake boats requiring 15,000 tons of plates and the Standard Oil Co.'s steel work requiring 900 tons is still pending. Hot-rolled strip steel is not firm. On narrow strips and bands, 2.90c. is being quoted, but on wide strip mills will go to 2.75c. or possibly lower.

Jobbers quote steel bars, 3.36c.; plates and structural shapes, 3.46c.; No. 28 black sheets, 4.40c. to 4.65c.; No. 28 galvanized sheets, 5.60c. to 5.75c.; No. 10 blue annealed sheets, 3.60c. to 4c.; cold rolled rounds, 3.90c.; flats, squares and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 4.16c.; narrower than 1 in. or lighter than No. 20 gage, 4.66c.; No. 9 annealed wire, $3.50 per 100 lb.; No. 9 galvanized wire, $3.95 per 100 lb.; common wire nails, $3.60 base per 100 lb.

Pig Iron.—The market continues very dull with sales limited for most part to small lots. Foundries that have not previously covered for the second quarter, and these are mostly small consumers, are purchasing small lots as needed and on these are able to get quick shipments. The only inquiry of any size is from the Lima Locomotive Works, Lima, Ohio, for 2000 tons of foundry iron for the second quarter. A rather unusual situation is presented in that with the very limited buying, the demand for iron on contracts continues heavy and most furnaces are making shipments in excess of their production. Prices are weak at several points without a real test of the market. The Buffalo situation continues to affect the market in the surrounding territories. Foundry iron for western New York delivery has been sold on the basis of $21 Buffalo and there are reports of even lower quotations. In the Valley district, sales are reported at $22.50, although $23 is still the common Valley price. The Cleveland market remains apparently firm at $24 for local delivery, but $23 is the common quotation for

outside shipment. Offering of Buffalo iron in Cleveland below $22 furnace would probably result in lower local furnace prices, as at the $22 price, Buffalo iron can be delivered in Cleveland at $24.65 or 15c. above the local furnace delivery price. The market for Southern iron is very dull with prices unchanged at $23 to $23.50.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6 rate from Birmingham:

Basic, Valley furnace	$22.00
Northern No. 2 fdy., sil. 1.75 to 2.25	24.50
Southern fdy., sil. 1.75 to 2.25	$29.00 to 29.50
Malleable	24.50
Ohio silvery, 8 per cent	36.52
Standard low phos., Valley furnace	29.00

Reinforcing Bars.—The demand for small lots is fair. The Bourne-Fuller Co. has taken 200 tons for the Babes' and Children's Hospital, Cleveland, and several jobs requiring 200 to 300 tons are pending. Rail steel bars are firm at 2.10c. and soft steel bars are commonly quoted at 2.40c.

Semi-Finished Steel.—Most of the consumers in this territory are covered for the second quarter and new inquiry is light. The supply of slabs available at $40, Youngstown, has become plentiful. Sheet bars are firm at $42.50.

Sheets.—The Ford Motor Co. is buying sheets of various grades for its April requirements aggregating several thousand tons. Some of these have been placed and it is expected that the remainder will be bought before the end of the week. Generally the market is rather slow and shading to 3.75c. on black and to 4.90c. on galvanized sheets is more common. Blue annealed sheets are holding fairly firm but on these a 2.90c. price occasionally crops out. Mill stocks are moving slowly at irregular prices. Black sheets have sold from mill stock at 3.50c.

Bolts, Nuts and Rivets.—The bolt and nut market is weak and irregular and 60 and 10 per cent off list has become the common price for machine bolts except for very small orders and even this price has been shaded. Prices on carriage bolts show a similar condition and hot-pressed nuts are being quoted 25c. lower. Some makers are still holding to the recent prices. The demand is holding up well although consumers as a rule are buying from hand to mouth. Rivets are quiet. The leading local producer Monday opened its books for the second quarter at the regular price of 2.75c. for large rivets and 70 and 10 per cent off list for small rivets.

Iron Ore.—Considerable inquiry for ore has come out in the past few days and prices may be established almost any day. The inquiry from the Ford Motor Co. for 250,000 tons of ore has again become very active. This was kept open for quotations until March 15 and a considerable range in prices was quoted. There appears to be more uncertainty about prices than there has been during recent years at a time so near that at which prices will be named. It is expected that the market will be established for the season at the prices at which the Ford business is placed unless some seller disposes of a round lot of ore before the Ford deal is closed. In view of the fact that basic pig iron is $9 a ton lower than when ore prices were established in March last year, many consumers think some reduction in ore prices should be made. On the other hand, producers contend that there should be no reduction because mining costs are fully as high as a year ago.

Coke.—A limited demand has sprung up for second quarter contracts for foundry coke and a few sales have been made at $6.50. Standard Connellsville foundry coke for prompt shipment is unchanged at $5 to $6.50.

Old Material.—Prices have further declined on practically all grades and the market continues very dull. Mills are buying very little material and are showing no interest in the market, athough it is believed that some have their orders about cleaned up and will have to buy scrap shortly. Shipments are good and the recent holding up of material by mills has disappeared. Borings and turnings are particularly weak, these grades having declined about 75c. per ton.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel	$17.50 to $17.75
Rails for rolling	18.00 to 18.25
Rails under 3 ft.	18.75 to 19.00
Low phosphorus melting	20.00 to 20.25
Cast borings	14.00 to 14.25
Machine shop turnings	13.50 to 13.75
Mixed borings and short turnings	13.75 to 14.00
Compressed sheet steel	15.75 to 16.00
Railroad wrought	13.75 to 14.00
Railroad malleable	20.50 to 20.75
Light bundled sheet stampings	12.00 to 12.25
Steel axle turnings	15.50 to 15.75
No. 1 cast	21.00 to 21.50
No. 1 busheling	12.00 to 12.25
Drop forge flashings	11.75 to 12.00
Railroad grate bars	16.25 to 16.50
Stove plate	16.25 to 16.50
Pipes and flues	11.50 to 12.00

Philadelphia

Steel Buying Has Declined Considerably and Shipments Now Exceed New Orders

PHILADELPHIA, March 18.—Steel buying has declined in volume to such an extent within the past two weeks that shipments from nearly all Eastern mills are now in excess of tonnage being put on the books. This is most noticeable in plates, shapes and bars, although other products are also affected. To what extent the weakness in prices of the heavier products enters into the situation is not fully apparent, the view of many in the trade being that many buyers are so upset over the failure of Congress to enact a new tax measure and the revelations of Congressional investigating committees that whatever hesitancy might be due to the price situation is intensified by political developments.

There are mixed opinions as to the effect which talk of cheap foreign steel may have upon demand. A local steel jobber has received 100 tons of bar-size angles from Luxemburg and rejected 65 tons of the lot because of the condition of the material. Some of it was in millimeter measurements, some was badly bent in loading and unloading and a good deal was too heavy in the fillet. This jobber has stated that his experience leads him to believe that foreign steel will not be a serious factor. The experience of others is that steel from England is preferable to that rolled in Continental mills and the heavier products are received in much better condition than the lighter shapes. A local fabricator who has received some heavier shapes from abroad is reported to be well satisfied with his purchase.

Pig Iron.—The pig iron market is weak, but there has not been enough business to test prices, except in basic, a steel company having completed a purchase of about 5000 tons at $21.50, delivered. Foundry iron is quoted at $22.50 to $23, furnace, for No. 2 plain, with 50c. differentials for higher grade of silicon, but sometimes these differentials are waived. There appears to be no doubt that on an attractive tonnage $22, furnace, would be quoted. Foreign foundry iron is not a serious factor, but imported low phosphorus iron continues to make it difficult for seaboard furnaces. The foreign iron is available at $26, f.o.b. cars Philadelphia. Last week's receipts of foreign iron were only 500 tons, all from British India.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to $1.63 per gross ton.

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$23.63 to $24.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	24.13 to 24.63
East. Pa. No. 1X	24.63 to 25.13
Virginia No. 2 plain, 1.75 to 2.25 sil.	30.17 to 31.17
Virginia No. 2X, 2.25 to 2.75 sil.	30.67 to 31.67
Basic delivery eastern Pa.	21.50 to 22.50
Gray forge	22.00 to 23.00
Malleable	23.75 to 24.25
Standard low phos. (f.o.b. furnace)	27.00 to 27.50
Copper bearing low phos. (f.o.b. furnace)	27.00 to 28.00

Ferroal'oys.—Ferromanganese is quoted at $107.50, seaboard or furnace, by both foreign and domestic producers, with reports that this price is occasionally being shaded. Spiegeleisen is quoted at $38 to $40, furnace, with foreign being offered at a little less.

Coke.—Most of the eastern Pennsylvania furnaces have covered for second quarter coke at prices ranging from $4.25 to $4.50, Connellsville, the higher price on the low phosphorus grades. Foundry coke is to be had at about $5, ovens.

Billets.—Whi'e nominally quoted at $45, Pittsburgh, forging bi'lets have been sold at as low as $42. Rerolling billets remain at $40, Pittsburgh. Seven hundred and fifty tons of blooms were received from France last week.

Plates.—Orders for plates show a falling off and prices are weaker. The common quotation on carload lots is now 2.30c., Pittsburgh, while tonnages a little more attractive have been sold at 2.25c. Reports of 2.20c. quotations are common, but are denied by the mills credited with having made them. The chief consideration in every sa'e of plates is the net price at the mill, so that extras and freight rate differentials are taken into consideration when making a base price. The Southern Pacific Railroad is taking bids on two boats, each requiring 3600 tons of steel, mostly plates.

Structural Material.—Bids on the 20,000 tons of fabricated steel for the Delaware River bridge will be opened Wednesday, March 19. This is the largest local structural project, and in fact the only one of importance now pend'ng. Several apartment buildings are talked of, but the steel requirements have not come into the market. Plain material is being quoted from 2.30c. to 2.40c., Pittsburgh, depending upon the mill, the character and size of the specification.

Bars.—Orders for bars are at a fair rate, but most of the mills are not getting as large a volume as they received last month. The lower prices that are being quoted for prompt shipment material are affecting specification on first quarter contract to some extent when the price in the contract is 2.40c. Some second quarter prices have been made and not at all at one price. Bars are not difficult to get at 2.35c., Pittsburgh, and 2.30c. is being quoted in occasional instances on merchant steel as well as on concrete reinforcing bars. Demand for bar iron is light and the price is unchanged at 2.25c., Pittsburgh.

Sheets.—Concessions of about $2 a ton continue on all grades of sheets, but are not made by all mills. The price situation is probably not so strong as it was earl'er in th's quar'er due to the growing need of some mills for more tonnage.

Warehouse Business.—Demand for steel products out of stock cont'nues fairly good. Prices are unchanged and for local delivery are as follows:

Soft steel bars and small shapes, 3.47c.; iron bars (except bands), 3.47c.; round edge iron, 3.75c.; round edge steel, iron finished, 1½ x ½ in., 3.70c.; round edge steel planished, 4.30c.; tank steel plates, ¼ in. and heavier, 3.57c.; tank steel plates, ⅜ in., 3.82c.; blue annealed steel sheets, No. 10 gage, 4.10c.; black sheets, No. 28 gage, 5.15c.; galvanized sheets, No. 28 gage, 6.25c.; square twisted and deformed steel bars, 3.57c.; structural shapes, 3.57c.; diamond pattern plates, ¼-in., 5.40c.; ⅜-in., 5.60c.; spring steel, 5c.; round cold-rolled steel, 4.35c.; squares and hexagons, cold-rolled steel, 4.85c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.27c.; narrower than 1 in., all gages, 4.77c.; steel bands, No. 12 gage to ⅛-in., inclusive, 4.27c.; rails, 3.47c.; tool steel, 8.50c.; Norway iron, 7c.

Ore.—Last week's iron ore receipts from abroad at this port were 5921 tons from Spain, 7293 tons from Sweden and 1500 tons of manganese ore was received from British India.

Old Material.—One or two mills are taking in moderate lots of No. 1 heavy melting steel at $17.50. A sale of 1500 tons was made at $17.25. However, some dealers are obliged to sell to brokers who have old orders and in such instances not over $16.50, delivered, is being paid, and efforts are being made by brokers to buy at even lower prices. Other grades of scrap have shown very little price change in the past week, but prices are nominal in most instances because of lack of transactions.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$16.50 to $17.50
Scrap rails	16.50 to 17.50
Steel rails for rolling	19.00 to 20.00
No. 1 low phos., heavy 0.04 and under	22.00 to 23.00
Couplers and knuckles	21.00 to 22.00
Cast-iron car wheels	18.50 to 19.50
Rolled steel wheels	21.00 to 22.00
No. 1 railroad wrought	19.00 to 20.00
No. 1 yard wrought	17.00 to 18.00
No. 1 forge fire	15.00
Bundled sheets (for steel works)	15.00
Mixed borings and turnings (for blast furnace use)	14.50 to 15.00
Machine shop turnings (for steel works use)	15.00
Machine shop turnings (for rolling mill use)	15.00 to 15.50
Heavy axle turnings (or equivalent)	15.50 to 16.00
Cast borings (for steel works and rolling mills)	15.00 to 15.50
Cast borings (for chemical plants)	17.00 to 18.00
No. 1 cast	18.50 to 19.50
Heavy breakable cast (for steel plants)	17.00 to 17.50
Railroad grate bars	16.50 to 17.00
Stove plate (for steel plant use)	16.50 to 17.00
Railroad malleable	17.50 to 18.00
Wrought iron and soft steel pipes and tubes (new specifications)	15.00 to 16.00
Shafting	22.00 to 23.00
Steel axles	22.00 to 23.00

PRYING INTO PRIVATE PAPERS

Supreme Court Bars Commission from Carrying on "Fishing Expeditions"

WASHINGTON, March 18.—The Supreme Court, in one of the most important decisions it has made as to the right of the Federal Government to interfere with business, yesterday decided that the Federal Trade Commission has no authority to "direct fishing expeditions" into private papers on the possibility that they may disclose evidence of crime.

The decision of the court, written by Associate Justice Oliver Wendell Holmes, was unanimous, and was handed down in the cases of the Federal Trade Commission against the American Tobacco Co. and against P. Lorillard Co., Inc. It is the result of an investigation instituted by the commission in compliance with a resolution adopted by the Senate, Aug. 9, 1921, directing the commission to investigate the tobacco situation in the United States as to the domestic and export trade.

An investigation was begun by the commission, which made a demand on these companies for certain documents and correspondence files relating to transactions with their jobbers. They refused, and the commission applied to the United States Court for the Southern District of New York for a writ of mandamus. The court declined to issue it. The commission then brought the matter direct to the Supreme Court, which yesterday affirmed the decision of the District Court with costs to the Government.

The decision declared that the mere facts of carrying on a commerce not confined within State lines, and of being organized as a corporation, do not make men's affairs public, and that "anyone who respects the spirit as well as the letter of the Fourth Amendment would be loath to believe that Congress intended to authorize one of its subordinate agencies to sweep all our traditions into the fire and to direct fishing expeditions into private papers on the possibility that they may disclose evidence of crime."

Steel for Sheet Mill Awarded

YOUNGSTOWN, March 18.—Contract for 1800 tons of structural steel for its proposed new sheet mill plant to be erected at the Brier Hill property has been awarded by the Youngstown Sheet & Tube Co. to the Blaw-Knox Co., Pittsburgh. Work on the buildings will commence at once and will be completed in about four months. The company has awarded contracts for rolling mill equipment to the United Engineering & Foundry Co., Pittsburgh.

STRUCTURAL STEEL SALES

February Business 3 Per Cent Over January, but 6½ Per Cent Under February, 1923

WASHINGTON, March 18.—The Department of Commerce announces sales of fabricated structural steel for February, based on figures received from the principal fabricators, as 73 per cent of capacity, with total sales of 167,322 tons reported by firms with a capacity of 228,155 tons per month. Shipments of firms reporting this item represented 60 per cent of capacity as against 64 per cent in January. Shipments in October were 79 per cent of capacity; in November 69 per cent and in December 66 per cent.

The table below lists the statistics reported by 180 identical firms (of which eight are now out of business), with a present capacity of 234,505 tons per month, comparing with 238,205 tons in 1923 and 232,125 in 1922. For comparative purposes, the percentage figures are prorated to obtain an estimated total for the United States, based on a capacity of 250,000 tons per month for 1922 and 260,000 tons per month in 1923 and 1924.

	Bookings		
1923	Actual Tonnage	Per Cent of Capacity	Computed Tonnage
January	174,100	73	189,800
February	185,763	78	202,800
March	221,342	93	241,800
April	187,271	79	205,400
May	132,873	56	145,600
June	119,086	50	130,000
July	118,386	50	130,000
August	135,914	57	148,200
September	122,401	52	135,200
October	[1] 113,536	48	124,800
November	[2] 126,482	53	137,800
December	[3] 188,762	79	205,400
1924			
January	[3] 165,219	71	184,600
February	[4] 167,322	73	189,800

[1] Reported by 175 firms with a capacity of 238,005 tons.
[2] Reported by 174 firms with a capacity of 237,755 tons.
[3] Reported by 168 firms with a capacity of 232,195 tons.
[4] Reported by 158 firms with a capacity of 228,155 tons.

Cast Iron Pipe Statistics for January

WASHINGTON, March 15.—The Department of Commerce announces statistics on production, shipments, orders and stock of cast iron pipe for January. This report includes returns from 11 establishments and is confined to bell and spigot pressure pipe exclusively. Previous reports included returns from 12 establishments, one of which failed to make a return for January. The following table gives the total tonnage for each of the principal items of the industry:

Pipe produced during the month (tons)	81,431
Pipe shipped during the month (tons)	63,987
Orders specified to be shipped from stock (tons)	30,827
Orders specified to be made (tons)	171,941
Orders not specified as to size (tons)	1,779

New Process for Making Sponge Iron

A new process for the production of sponge iron has been developed by the Department of the Interior, in cooperation with the University of Washington, as the result of experimental work conducted during the past three years at the Northwest experiment station of the Bureau of Mines, Seattle. Sponge iron, because of its porous structure and consequent exposure of an extremely large surface of metallic iron, is especially adaptable to the precipitation of copper, lead and other metals from their solution. The development of a process by which sponge iron may be made cheaply from iron ore and low-grade coal and afterward converted into iron and steel products by treatment in the electric furnace would be of economic importance to the Pacific Coast region of the United States, a territory remote from the larger iron and steel producing centers, but endowed with cheap electric energy to take the place of the expensive coke that would otherwise have to be utilized in iron and steel production.

The process consists in passing a mixture of iron ore and coal through a rotating kiln heated at one end to a temperature sufficient to convert iron oxide to metallic iron, discharging, cooling and separating the sponge iron from the residual coke and siliceous material on a magnetic separator. It is stated that sponge iron probably will be made from such by-product materials as flue dust, pyrite cinder, various slags of high iron content, and iron oxide sludge.

Details of these experiments are given in serial 2578, by Clyde E. Williams, Edward P. Barrett and Bernard M. Larsen, which may be obtained from the Department of the Interior, Bureau of Mines, Washington.

Aluminum in 1923

The value of new aluminum produced in the United States during 1923 was $28,305,000, which is more than double the value of aluminum produced in 1922 at domestic plants, according to a statement prepared by James M. Hill of the Geological Survey. The great expansion in the consumption of aluminum was very largely due to the increase in the construction of automobiles. It is estimated that 25 per cent of the domestic aluminum produced is consumed by makers of automobiles, who used 72,700,000 lb. of the metal in 1922. The imports and exports are as follows:

Imports into the United States in 1922 and 1923 in Pounds

Class	1922	1923
Metal, crude scrap and alloy	39,951,690	43,065,039
Manufactures of plates, sheets and bars	Value only given	1,288,651
Hollow ware	Value only given	648,933

Exports from the United States in 1922 and 1923 in Pounds

Class	1922	1923
Ingot, scrap and alloys	1,538,079	1,169,753
Plates, sheets, bars, strips and rods	2,808,941	4,369,918
Tubes, moldings, castings and other shapes	353,847	442,370
Table, kitchen and hospital utensils	1,255,743	1,175,659
Other manufactures	2,935,359	3,820,406

The development during the year of silicon-aluminum alloys is one that would appear to be far reaching. Heretofore silicon has been believed to be very harmful in the metal, and in all steps in mining the ore and in making aluminum every precaution was taken to remove silica, but it would now seem that bauxite of lower grade than has heretofore been considered usable may be employed in making the metal.

Great Activity of Plants of Youngstown Sheet & Tube Co.

Excepting its blast furnace and lapweld pipe departments, the Youngstown Sheet & Tube Co., Youngstown, is operating its Eastern and Western properties at an average rate in excess of 90 per cent. Repair and reconstruction work is partially responsible for idleness of some of the pipe furnaces.

The company's schedules this week show 13 of 17 blast furnaces in action, including nine in the Youngstown district, two at South Chicago, one at Indiana Harbor and one at Mayville, Wis. Its three by-product coke oven plants at East Youngstown, Indiana Harbor and Mayville, Wis., are active.

Its steel ingot capacity is operating above 90 per cent., as 24 of the 30 open-hearth furnaces operated by the company are melting. The active units are divided as follows—10 at the East Youngstown plant, 10 at the Brier Hill works and four at Indiana Harbor.

The Bessemer plants at Indiana Harbor and East Youngstown are in commission, as well as the blooming mills at both properties.

Of the company's 20 pipe mills, seven of the 11 lapweld mills are rolling and all of its nine buttweld units. All of the company's 22 sheet mills located in the Mahoning Valley are rolling, its six skelp mills, including four at East Youngstown and two at Indiana Harbor; two plate mills at the Brier Hill works and two merchant bar mills at East Youngstown.

Rod, wire, nail, conduit and puddle mill departments are active.

Prices Finished Iron and Steel f. o. b. Pittsburgh

Carload Lots

Plates

Sheared, tank quality, base, per lb.....2.40c. to 2.50c.

Structural Materials

Beams, channels, etc., base, per lb.....2.40c. to 2.50c.
Sheet piling .....2.65c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.40c.
Soft steel bars for cold finishing.....$3 per ton over base
Reinforcing steel bars, base.....2.40c.
Refined iron bars, base, per lb.....3.10c. to 3.15c.
Double refined iron bars, base, per lb.....4.75c.
Stay bolt iron bars, base, per lb.....7.75c. to 8c.

Hot-Rolled Flats

Hoops, base, per lb.....2.90c. to 3.00c.
Bands, base, per lb.....2.90c. to 3.00c.
Strips, base, per lb.....2.90c. to 3.00c.

Cold-Finished Steel

Bars and shafting, base, per lb.....3c.
Bars and shafting, l.c.c., per lb.....3.25c.
Bars, S. A. E. Series, No. 2100.....4.75c.
Bars, S. A. E. Series, No. 2300.....6.25c. to 6.50c.
Bars, S. A. E. Series, No. 3100.....5.25c. to 5.50c.
Strips, base, per lb.....4.75c. to 5.00c.

Wire Products

(To jobbers in car lots)

Nails, base, per keg.....$3.00
Galvanized nails, 1 in. and over.....$2.25 over base
Galvanized nails, less than 1 in..... 2.50 over base
Bright plain wire, base, No. 9 gage, per 100 lb.....$2.75
Annealed fence wire, base, per 100 lb..... 2.90
Spring wire, base, per 100 lb..... 3.70
Galvanized wire No. 9, base, per 100 lb..... 3.35
Galvanized barbed, base, per 100 lb..... 3.80
Galvanized staples, base, per keg..... 3.80
Painted barbed wire, base, per 100 lb..... 3.45
Polished staples, base, per keg..... 3.45
Cement coated nails, base, per count keg.....$2.50 to 2.70
Bale ties, carloads to jobbers.....75 and 2½ per cent off list
Woven fence, carloads (to jobbers).....67½ per cent off list
Woven fence, carloads (to retailers).....65 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads,
60, 10 and 5 to 60, 10 and 10 per cent off list
Machine bolts, all sizes, cut threads,
60 and 5 to 60 and 10 per cent off list
Carriage bolts, ¾ x 6 in.:
Smaller and shorter, rolled threads,
60 and 5 to 60 and 10 per cent off list
Carriage bolts, cut threads, all sizes,
50, 10 and 5 to 50, 10 and 10 per cent off list
Lag bolts ..... 65 and 5 to 65 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads..50 and 10 per cent off list
Other style heads .....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.,
50 and 5 to 50 and 10 per cent off list
Larger and longer sizes,
50 and 5 to 50 and 10 per cent off list
Hot pressed squares or hex. nuts, blank.4.25c. to 4.50c. off list
Hot pressed nuts, tapped.....4.25c. to 4.50c. off list
C.p.c. and t. square or hex. nuts, blank.....4c. off list
C.p.c. and t square or hex. nuts, tapped.....4c. off list
Semi-finished hex. nuts:
⅞ in. and smaller, U. S. S.....80 and 5 per cent off list
⅞ in. and larger, U. S. S.....75 and 5 per cent off list
Small sizes, S. A. E.....80, 10 and 5 per cent off list
S. A. E., ⅞ in. and larger.....75, 10 and 5 per cent off list
Stove bolts in packages.....75, 10 and 5 per cent off list
Stove bolts in bulk.....75, 10, 5 and 2½ per cent off list
Tire bolts .....60 and 10 per cent off list
Bolt ends with hot pressed nuts.....60 and 5 per cent off list
Bolt ends with cold pressed nuts.....50 and 5 per cent off list
Turnbuckles, with ends, ½ in. and smaller,
50 to 55 and 5 per cent off list
Turnbuckles, without ends, ½ in. and smaller,
65 and 5 to 70 and 10 per cent off list
Washers .....5c. to 5.25c. off list

Semi-Finished Castellated and Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh.)

	Per 1000 S. A. E.	Per 1000 U. S. S.		Per 1000 S. A. E.	Per 1000 U. S. S.
¼-in.	$4.80	$4.80	⅞-in.	$15.00	$15.00
5/16-in.	5.50	6.00	1-in.	19.50	20.00
⅜-in.	6.50	7.00	1¼-in.	28.50	28.50
7/16-in.	9.00	9.50	1½-in.	37.00	37.50
½-in.	11.00	11.50	1¾-in.	58.50	60.50

Larger sizes—Prices on application.

Cap and Set Screws

Milled hex. head cap screws.....75, 10 and 5 per cent off list
Milled standard set screws, case hardened
75, 10 and 5 per cent off list
Milled headless set screws, cut thread
75, 10 and 5 per cent off list
Upset hex. head cap screws, U. S. S. thread
80, 10 and 10 per cent off list
Upset hex. head cap screws, S. A. E. thread
80, 10 and 10 per cent off list
Milled studs.....65 and 10 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb.....$2.75
Small rivets .....70 and 10 per cent off list

Track Equipment

Spikes, ⅝ in. and larger, base, per 100 lb.....$3.00 to $3.15
Spikes, ½ in., 7/16 in. and ⅜ in., per 100 lb..... 3.25 to 3.50
Spikes, 7/16 in..... 3.25 to 3.50
Spikes, boat and barge, base, per 100 lb..... 3.25 to 3.50
Track bolts, ¾ in. and larger, base, per 100 lb.. 4.00 to 4.25
Track bolts, ½ in. and ⅝ in., base, per 100 lb.. 4.50 to 5.00
Tie plates, per 100 lb..... 2.60
Angle bars, base, per 100 lb..... 2.75

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ to ⅜	+19	+54
½	53	42½	½	21	7
¾	58	47½	¾	28	12
1 to 1½	60	49½	1 to 1½	30	14

Lap Weld, extra strong, plain ends

2	53	42	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 per cent on black and 1½ points, with a supplementary discount of 5 per cent on galvanized.

Boiler Tubes

Lap Welded Steel		*Charcoal Iron*	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1¾ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Less carload lots 4 points less.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	55	3 and 3¼ in.	36
1¼ and 1½ in.	47	3½ and 3¾ in.	37
1¾ in.	31	4 in.	41
2 and 2¼ in.	22	4½ in. and 5 in.	33
2½ and 2¾ in.	32		

Hot Rolled

3 and 3¼ in.	38	4 in.	43
3½ in. and 3¾ in.	39		

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of net larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base.....83 per cent off list
Carbon 0.30 to 0.40, base.....81 per cent off list
Plus usual differentials and extras for cutting. Warehouse discounts range higher.

Seamless Locomotive and Superheater Tubes

	Cents per Ft.		Cents per Ft.
2-in. O.D. 12 gage	15	2¼-in. O.D. 10 gage	20
2-in. O.D. 11 gage	16	3-in. O.D. 7 gage	35
2-in. O.D. 10 gage	17	1½-in. O.D. 9 gage	15
2¼-in. O.D. 12 gage	17	5⅝-in. O.D. 9 gage	55
2¼-in. O.D. 11 gage	18	5½-in. O.D. 9 gage	57

Tin Plate

Standard cokes, per base box.....$5.50

Terne Plate

(Per Package, 20 x 28 in.)

8-lb. coating, 100 lb. base	$11.00	20-lb. coating I. C.	$14.90
8-lb. coating I. C.	11.30	25-lb. coating I. C.	16.20
12-lb. coating I. C.	12.70	30-lb. coating I. C.	17.35
15-lb. coating I. C.	13.95	35-lb. coating I. C.	18.35
		40-lb. coating I. C.	19.35

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.90c. to 3c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.75c. to 3.85c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb.....5.35c.

Galvanized

No .28 (base), per lb.....4.90c. to 5c.

Long Ternes

No. 28 gage (base), 8-lb. coating, per lb.....5.30c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.85c

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$6.45
Old range non-Bessemer, 51½ per cent iron	5.70
Mesabi Bessemer, 55 per cent iron	6.20
Mesabi non-Bessemer, 51½ per cent iron	5.55

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	11.00c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal	45c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus	42c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, per unit, in 60 per cent concentrates	$8.25 to $10.00
Chrome ore, basic, 48 per cent Cr_2O_3, crude, per ton, c.i.f. Atlantic seaboard	18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	75c. to 85c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton	$107.50
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid	107.50
Ferrosilicon, 50 per cent, delivered	75.00
Ferrosilicon, 75 per cent	140.00
Ferrotungsten, per lb. contained metal	85c. to 90c.
Ferrochromium, 4 to 6 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered	10.75c.
Ferrochromium, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb.	10.50c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent.....$38.00 to $40.00
Spiegeleisen, domestic, 16 to 19 per cent..... 37.00 to 38.00
Ferrosilicon, Bessemer, 10 per cent, $42.50; 11 per cent, $45; 12 per cent, $47.50.
Silvery iron, 5 per cent, $30.00; 6 per cent, $31.00; 7 per cent, $32.00; 8 per cent, $33.50; 9 per cent, $35.50; 10 per cent, $37.50; 11 per cent, $40.00; 12 per cent, $42.50.

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	$19.00 to $22.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	$22.00 to $23.50

Per 1000 f.o.b. works:

Fire Clay	High Duty	Modern Duty
Pennsylvania	$42.00 to $45.00	$37.00 to $42.00
Maryland	47.06	42.00
Ohio	42.00 to 43.00	37.00 to 39.00
Kentucky	42.00 to 43.00	37.00 to 39.00
Illinois	——	37.00 to 42.00
Missouri	42.00 to 45.00	35.00 to 40.00
Ground fire clay, per net ton		6.00 to 7.00
Silica Brick:		
Pennsylvania		$40.00 to 42.00
Chicago		49.00
Birmingham		50.00
Ground silica clay, per net ton		8.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		47.00

Semi-Finished Steel, F.O.B. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$40.00
Rolling billets, 2-in. and under	40.00
Forging billets, ordinary carbons	45.00
Sheet bars, Bessemer	42.50
Sheet bars, open-hearth	42.50
Slabs	40.00
Wire rods, common soft, base, No. 5 to ⅜-in.	51.00
Wire rods, common soft, coarser than ⅜-in.	$2.50 over base
Wire rods, screw stock	$5.00 per ton over base
Wire rods, carbon, 0.20 to 0.40	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75	7.50 per ton over base
Wire rods, carbon over 0.75	10.00 per ton over base
Wire rods, acid	15.00 per ton over base
Skelp, grooved, per lb.	2.30c.
Skelp, sheared, per lb.	2.30c.
Skelp, universal, per ton	2.30c.

Finished Iron and Steel, F.O.B. Mill

Rails, heavy, per gross ton	$43.00
Rails, light, new steel, base, lb.	2c. to 2.15c.
Rails, light, rerolled, base, per lb.	1.85c. to 2.00c.
Spikes, ⅜-in. and larger, base, per 100 lb.	$3.00 to $3.15
Spikes, ½-in. and smaller, base, per 100 lb.	3.25 to 3.50
Spikes, boat and barge, base, per 100 lb.	3.25 to 3.50
Track bolts, ⅝-in. and smaller, base, per 100 lb.	4.00 to 4.25
Track bolts, ¾-in. and larger, base, per 100 lb.	4.50 to 5.00
Tie plates, per 100 lb.	2.60
Angle bars, per 100 lb.	2.75
Bars, common iron, base, per lb., Chicago mill	2.40c.
Bars, common iron, Pittsburgh mill	2.40c.
Bars, rails, steel reinforcing, base, per lb.	2.15c. to 2.25c.
Cold finished steel bars, base, Chicago, per lb.	3c.
Ground shafting, base, per lb.	3.40c.
Cut nails, base, per keg	$3.15 to $3.25

Alloy Steel

S.A.E. Series Numbers	Bars 100 lb.
2100*(1¼% Nickel, 10 to 20 per cent Carbon)	$3.50
2300 (3½% Nickel)	$5.00 to 5.25
2500 (5% Nickel)	7.75 to 8.00
3100 (Nickel Chromium)	4.00 to 4.25
3200 (Nickel Chromium)	5.75 to 6.00
3300 (Nickel Chromium)	8.00 to 8.25
3400 (Nickel Chromium)	7.00 to 7.25
5100 (Chromium Steel)	3.75
5200*(Chromium Steel)	7.50 to 8.00
6100 (Chromium Vanadium bars)	4.75 to 5.00
6100 (Chromium Vanadium spring steel)	4.50 to 4.75
9250 (Silico Manganese spring steel)	3.75 to 4.00
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	5.00 to 5.25
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum)	4.50 to 4.75
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	4.25 to 4.50
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.75 to 5.00

Above prices are for hot-rolled alloy steel bars, forging quality, per 100 lb., f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are $10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets the net ton bar price applies.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, carload lots, 36,000 lb. minimum carload, per 100 lb.:

Philadelphia, domestic	$0.32	Buffalo	$0.265	St. Louis	$0.43	*Pacific Coast	$1.15
*Philadelphia, export	0.235	Cleveland	0.215	Kansas City	0.735	*Pac. Coast, ship plates	1.20
Baltimore, domestic	0.31	Cleveland, Youngstown Comb.	0.19	Kansas City (pipe)	0.705	Birmingham	0.58
Baltimore, export	0.225	Detroit	0.29	St. Paul	0.60	Memphis	0.56
New York, domestic	0.34	Cincinnati	0.29	Omaha	0.735	Jacksonville, all rail	0.70
New York, export	0.255	Indianapolis	0.31	Omaha (pipe)	0.705	Jacksonville, rail and water	0.415
Boston, domestic	0.365	Chicago	0.34	*Denver	1.15	New Orleans	0.67
Boston, export	0.255			†Denver (pipe)	1.17		

*Applies minimum carload 80,000 lb. †Minimum loading 46,000 lb.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 35c.; ship plates, 40c.; ingots and muck bars, structural steel, common wire products, including cut or wire nails, spikes, and wire hoops, 40c.; sheets and tin plates, 40c.; sheets No. 12 gage and lighter, 50c.; rods, 40c.; wire rope cables and strands, 45c.; wire fencing, netting and stretcher, 40c.; pipes not over 12 in. in diameter, 55c.; over 12 in. in diameter, 2½c. per in. or fraction thereof additional. All rates per 100 lb. in carload lots, minimum 36,000 lb.

FABRICATED STEEL BUSINESS

Public Work Forms Large Part of 23,000 Tons of Awards—Fresh Inquiries 34,500 Tons

Another good week in fabricated steel work shows that public projects account for over 10,000 tons of 23,000 tons put under contract. The East again looms large in bookings and inquiries. About 34,500 tons additional work is now under negotiation, about two-thirds for private enterprises and most of the remainder for public work, especially schoolhouses. Awards include:

School building, New York, 1250 tons, to Harris Structural Steel Co.

Two school buildings, New York, 2500 tons, to McClintic-Marshall Co.

Levy loft addition, Thirty-eighth Street and Eighth Avenue, New York, 600 tons, to Harris Structural Steel Co.

Apartment building, Eleventh Street, New York, 500 tons, to A. E. Norton, Inc.

New York Telephone Co., Williamsbridge exchange building, 500 tons, to Hay Foundry & Iron Works.

Italian Savings Bank, New York, 800 tons, to Levering & Garrigues Co.

Minskoff apartment buildings, New York, 2200 tons, to Bethlehem Fabricators, Inc.

New York Central Railroad, bridges, 900 tons, steel fabrication placed by general contractor with American Bridge Co.

Apartment building, Philadelphia, 350 tons, to American Bridge Co.

Brooklyn Union Gas Co. building, Brooklyn, 500 tons, to Berlin Construction Co.

Fifth Avenue Presbyterian Church, addition, New York, 450 tons, to Levering & Garrigues Co.

Haverhill, Mass., highway bridge, 700 tons, to Boston Bridge Works.

Washington Terminal, Washington, D. C., train shed, 300 tons, to Belmont Iron Works.

H. E. Bell, Chicago, office and store building, 1329 tons, to Moravia Construction Co.

Schaefer road grade separation, Spring Wells, Mich., 650 tons, to McClintic-Marshall Co.

Kings mill bridge over Dix River, Danville, Ky., 233 tons, to American Bridge Co.

High school auditorium, Elkhart, Ind., 200 tons, to Elkhart Bridge & Iron Co.

Erie Railroad, Hornell, N. Y., store house, 191 tons, to Jones & Laughlin Steel Corporation.

Hoyt Metal Co., Granite City, Ill., addition to building A, 148 tons, to Mississippi Valley Structural Steel Co.

Otis Elevator Co., Quincy, Ill., boiler house, 115 tons to unnamed fabricator.

A. E. Staley Mfg. Co., Decatur, Ill., steep house, 100 tons, to Mississippi Valley Structural Steel Co.

Commonwealth Life Insurance Co., Louisville, Ky., 185 tons, to Snead Architectural Iron Works Co.

Louisville & Nashville Railroad, freight house at Covington, Ky., 150 tons, to Louisville Bridge & Iron Co.

Union Bank & Trust Co., Huntington, W. Va., 650 tons, general contract to George A. Fuller Co., steel reported awarded to Cleveland fabricator.

Erie Steam Shovel Co., Erie, Pa., factory building, 500 tons, to Fort Pitt Bridge Works.

School No. 201, New York, 1000 tons, to Jones & Laughlin Steel Corporation.

Tennessee Coal, Iron & Railroad Co., 12 steel barges for Warrior River service, 1700 tons, to American Bridge Co.

Detroit & Ironton Railroad, bridge over Michigan Central tracks, 275 tons, to Wisconsin Bridge & Iron Co.

Independence Road bridge over Blue River, Kansas City, Mo., 220 tons, to Wisconsin Bridge & Iron Co.

Stanley Building, Erie, Pa., 400 tons, to Erie Steel Construction Co.

Aquinas Institute, Rochester, N. Y., 300 tons, to Genesee Bridge Co.

Simonds Saw & Steel Co., Lockport, N. Y., addition 200 tons, to Kellogg Structural Steel Co.

Niagara Falls, Lockport & Ontario Power Co., towers, 400 tons to Archbold-Brady Co.

Waterman Building, Boston, 575 tons, to Levering & Garrigues Co.

Gilchrist Building, Boston, addition, 150 tons, to New England Structural Co.

Bridge, Springfield, Mass., 140 tons, to American Bridge Co.

California Avenue bascule bridge, Chicago, 1200 tons, to Mt. Vernon Bridge Co.

Spaulding Brothers, North Tonawanda, N. Y., factory building, 450 tons, to Buffalo Structural Steel Co.

Toledo Museum of Art, 350 tons, to American Bridge Co.

Public School, Toledo, Ohio, 100 tons, to Donovan Wire & Iron Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Western Electric Co., main buildings for new plant at Kearny, N. J., 4000 tons.

Bloomingdale Brothers, garage, 410-422 East Fifty-fourth Street, New York, 1200 tons.

Schwartz loft building, garment district, New York, 1000 tons.

Office building, Eighth Avenue and Forty-third Street, New York, 500 tons.

Northern Union Gas Co., building at Jerome Avenue and Kingsbridge Road, New York, 750 tons.

Loft building, 28 East Fortieth Street, New York, 600 tons.

Public Schools Nos. 82, 83, 216, 217, 220 and 126, New York, about 7500 tons. Bids close April 8.

Loft building, 21 East Twenty-sixth Street, New York, 200 tons.

Indiana Electric Co., power plant in Indiana, 1000 tons. Stone & Webster, general contractors.

Wabash Railroad, building work, 400 tons.

City of New York, plate construction work at Flushing, Long Island, 1000 tons.

Statler Hotel, Boston, 5500 tons.

Garage and office building, Lake Street near Wabash Avenue, Chicago, 6000 tons.

Washington School Auditorium, Indiana Harbor, Ind., 400 tons.

Illinois Central, bridge work, 125 tons.

Lunkenheimer Co., Cincinnati, second unit of new plant at Hartwell, 650 tons, bids close March 24.

Apartment hotel, Asheville, N. C., 350 tons, bids being taken.

Republic National Bank Building, Dallas, Tex., 1500 tons.

Oxford Paper Co., Rumford, Me., mill, 200 tons.

City of Buffalo, viaduct, 1500 tons, bids to be taken March 27.

RAILROAD EQUIPMENT BUYING

Orders for 7275 Cars and 80 Locomotives and Inquiries for 5000 Cars and 56 Locomotives

Not including passenger equipment nor repair orders for 3095 cars, railroad equipment purchases included 7275 freight cars and 80 locomotives. Fresh inquiries appeared for 5000 cars, 1000 underframes and 56 locomotives. Among the items are the following:

The Southern Railway has placed orders for 25 passenger cars with the Bethlehem Steel Co. and for 20 passenger cars with the American Car & Foundry Co. The Pullman Co., it is reported, will build 5 dining cars for the same road.

The Norfolk & Western has let contracts for the repair of 700 steel gondolas by the Ralston Steel Car Co. and 300 steel gondolas by the Virginia Bridge & Iron Co.

The Chesapeake & Ohio Railroad has issued an inquiry for 3000 hopper bottom gondola cars and 2000 box cars.

The Pittsburgh Railways Co. has ordered 100 street cars from the Pressed Steel Car Co. and 100 from the Standard Steel Car Co.

Of the New York Central's purchases, 2000 cars will be built in the Buffalo plant of the American Car & Foundry Co.

The Illinois Central has placed orders for repairs on 900 box and 195 flat cars with the Pullman Co. and on 1000 box cars with the Ryan Car Co.

The New York, Chicago & St. Louis (Nickel Plate) has ordered 1000 box cars from the Illinois Car & Equipment Co., 300 stock cars from the General American Car Co. and 10 Mikado type and 10 8-wheel switching type locomotives from the Lima Locomotive Co. It has entered the market for 4 mail and express cars, 3 baggage and express cars and 5 coaches.

The Louisville & Nashville has placed 1150 box, 500 automobile and 150 flat cars with the Chickasaw Shipbuilding & Car Co., 1100 gondola and 500 box cars with the Pressed Steel Car Co., 500 automobile cars with the Mount Vernon Car & Mfg. Co., 8 baggage and 6 mail and baggage cars with the Pressed Steel Car Co., 20 coaches with the American Car & Foundry Co. and 18 Mikado type, 6 Pacific

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NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York		Straits Tin (Spot)	Lead		Zinc	
March	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
12.....	14.12½	13.75	59.00	9.40	9.40	6.90	6.55
13.....	14.12½	13.75	56.50	9.35	9.35	6.87½	6.52½
14.....	14.12½	13.75	56.80	9.25	9.25	6.92½	6.57½
15.....	14.12½	13.75	....	9.15	9.15	6.85	6.50
17.....	14.12½	13.75	56.25	9.15	9.15	6.80	6.45
18.....	14.12½	13.75	53.75	9.15	9.15	6.80	6.45

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, March 18.

European speculation in metals having collapsed, due to the recovery of the French franc, in which currency most of the buying was done, the entire market has weakened. There has been a sensational decline in tin prices both here and abroad, with marked weakness also in lead, to a slighter degree in zinc and some unsettling of the copper situation.

Copper.—The unloading of metal stocks held by foreign speculators has affected the copper market sympathetically at least. While the most serious decline occurred in tin prices, the markets for all other nonferrous metals have been more or less injured and copper has not escaped. There has been some unloading of stocks in second hands here at ⅛c. and ¼c. per lb. under the price quoted by producers, which is 14c., delivered, for Lake. Business has been extremely quiet and a certain degree of weakness might have been expected regardless of the foreign situation because of the overdoing of the recent advance. Prices were pushed up so quickly that the advance could not be expected to be maintained except under conditions of sustained buying. Producers, however, are in a fairly firm position and continue confident of the future, particularly if the outcome of the German reparations question is favorable to a resumption of foreign buying.

Tin.—The most sensational decline in tin prices that has occurred in a long time occurred today. The London price for spot standard is more than £33 below that of a week ago, a drop of £20 having occurred today. The market both here and abroad was strong a week ago, but weakness developed last Thursday, there was a slight recovery on Friday, with another small loss on Monday, and today the worst break occurred. Tin speculators in Holland who had bought heavily in francs when the French exchange was low were caught in a serious position when the franc recovered and are credited here with having thrown overboard a large part of their tin purchases to save themselves from further losses. A peculiar result of the sharp decline is that tin has been selling here at lower than its actual import cost. Twenty-five tons for April-May delivery was sold on the New York Metal Exchange today at 51.25c. per lb. and twenty-five tons for May-June delivery at 51c. After these sales the market recovered slightly, closing at 53.75c. Spot standard was today quoted in London at £263; future standard at the same price, while spot Straits was £265. The Singapore price today was £280.

Lead.—In view of the easier conditions in lead which prevailed a week ago, this metal was a prey to the unsettlement of the non-ferrous market due to the unloading of stocks held by speculators abroad. The lead price has declined nearly ½c. per lb. within a week. In the week ended March 11 quotations were fairly firm at 9.50c., New York, but had declined today to 9.15c. in the outside market. The contract price of the leading producer continues at 9c. Sales for spot shipment have been made at 9.25c. and for April at 9c., but the market is weak at this level.

Zinc.—The zinc market has weakened, being quoted today at 6.45c., St. Louis, which is 1/10c. below the quotation of March 11. There is very little demand.

Nickel.—The International Nickel Co.'s price continues at 29c. per lb. for shot and ingot, with 28c. being quoted in the outside market. Electrolytic, 99.80 per cent, is quoted at 32c.

Antimony.—Japanese and Chinese antimony is now being offered here at 11c. to 11.25c. per lb., New York, duty paid.

Aluminum.—Virgin ingot aluminum for shipment over the remainder of the year is offered at 29c. for 99 per cent pure and at 28c. for 98-99 per cent.

Old Metals.—The market is moving up and down following virgin metals. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.75
Copper, heavy and wire	12.50
Copper, light and bottoms	11.00
Heavy machine composition	11.00
Brass, heavy	8.75
Brass, light	7.25
No. 1 red brass or composition turnings	10.00
No. 1 yellow rod brass turnings	8.50
Lead, heavy	8.375
Lead, tea	7.25
Zinc	5.00
Cast aluminum	18.50
Sheet aluminum	18.50

Chicago

March 18.—Tin, lead and zinc have declined. Reductions in tin and lead were expected because they were so high. Zinc is weaker both on account of large output and disappointing foreign demand. Copper is quotably the same as a week ago, although in the meantime it has declined and advanced. Among the old metals, grades of copper, lead and zinc have declined. We quote in carload lots: Lake copper, 14.25c.; tin, 58c.; lead, 9.50c.; spelter, 6.50c.; antimony, 13.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 11.50c.; copper bottoms, 10c.; red brass, 9.25c.; yellow brass, 7.50c.; lead pipe, 7c.; zinc, 4c.; pewter, No. 1, 33c.; tin foil, 36c.; block tin, 45c.; all buying prices for less than carload lots.

Testimony as to Extras in Bethlehem-Midvale Merger Hearing

Two or three consumers of steel bars of forging quality testified last week in the Federal Trade Commission hearing in the Bethlehem-Midvale-Lackawanna steel merger case that one effect of the merger had been to advance the cost of forging steel in that the Bethlehem Steel Co. enforced the charging of a 25c. extra which had been waived in many instances, particularly by the Lackawanna Steel Co. One consumer testified that he had always bought ordinary commercial steel for forging purposes from Lackawanna at the price of merchant bars, but that the Bethlehem Steel Co., after the merger, insisted in every instance upon the 25c. extra.

Counsel for the Federal Trade Commission has taken a recess for one or two weeks to prepare for a continuation in New York of the hearing, which will last for some weeks.

Domestic sales of oak leather belting in February are reported by the Leather Belting Exchange, which represents about 60 per cent of the total product at 417,849 lb., with a total value of $710,761 or an average of $1.70 per lb. This compares with revised figures for January showing 441,266 lb., $757,213, and an average of $1.72 per lb., and with figures for February last year of 441,863 lb., $821,867, and an average of $1.86 per lb.

The Electric Hoist Manufacturers' Association reports that in February, 1924, 316 hoists were sold, a decrease from January of 10.98 per cent. These hoists were valued at $188,619, an increase over January of 5.06 per cent. Shipments for February were valued at $175,883, a falling off from January of 0.58 per cent.

PERSONAL

R. G. Widdows, who has been district manager in New York since 1911, for the Electric Controller & Mfg. Co., Cleveland, has been appointed sales manager of this company and will go to Cleveland April 1 to take up his new duties. He will be succeeded as New York district sales manager by W. R. Yorkey, who has represented the company in Boston. H. K. Hardcastle, representative in Philadelphia, has been appointed Philadelphia district sales manager.

Alfred E. Lindau, of the American Fence Co., Chicago, and formerly of Buffalo, has been named by Buffalo engineers as their representative on the American Engineering Council. The organization was formed in 1919 by Secretary Herbert Hoover, as the Federated American Engineering Societies to provide members in every city the opportunity to register their collective attitude on all questions affecting the public interest.

Arthur P. Skaer, formerly assistant chief engineer of the Corrugated Bar Co., has been named Buffalo district manager of the Kalman Steel Co.

H. A. Taylor, branch manager of the General Fireproofing Co. at Milwaukee, has been appointed Illinois district manager for the Concrete Steel Co., with headquarters at Chicago, succeeding C. A. Lord, recently appointed district manager at Kansas City, Mo.

MRS. F. P. McBerty, secretary-treasurer Federal Machine & Welder Co., Warren, Ohio, has sailed for England to attend the second International Conference of Women Engineers, which will be held at Manchester, April 2-5. Mrs. McBerty, who will attend this meeting as a representative of the National Federation of Business and Professional Women's Clubs of the United States, will present a paper on "Resistance Welding."

Ralph Blaisdell, formerly connected with the railroad administration in Washington, has been made treasurer of the Wickwire-Steel Corporation to succeed A. D. Berning.

James M. Eaton, general manager and assistant treasurer of the Gowan Truck Co., Holyoke, Mass., has resigned.

E. B. C. Goyne has been transferred from the Pittsburgh to the Cincinnati sales office of the Bethlehem Steel Co. He has been with the Bethlehem company since 1916 and before going to Pittsburgh, about two years ago, was in charge of the company's St. Louis office. He was placed in charge of the Pittsburgh office when the absorption of the Lackawanna Steel Co. resulted in the transfer of Edward S. Illig to Buffalo. Upon the merger of the Midvale Steel & Ordnance Co. with the Bethlehem Steel Co. and the consolidation of offices, he became assistant Pittsburgh district sales agent under J. E. McLain. Mr. Goyne is a graduate of Lehigh University, class of 1914.

Lon P. Sutter, formerly in charge of the Pittsburgh and New York sales offices of the Mark Mfg. Co. and the Steel & Tube Co. of America, has joined the sales department of the Union Drawn Steel Co., Beaver Falls, Pa., and will be located at the company's general office in Beaver Falls.

Ferry C. Houghten has been appointed secretary of the American Society of Heating and Ventilating Engineers, 29 West Thirty-ninth Street, New York, succeeding C. W. Obert, who resigned. Mr. Houghten has been connected with the United States Bureau of Mines at Pittsburgh since 1918, and in 1920 he became assistant to Dr. Allen, then director of the societies' research laboratory. He is a graduate of Olivet College (Michigan) and the University of Washington.

W. L. Goodrich and W. H. Rieger have been appointed special representatives for die block, shoe and trimmer steel by the Colonial Steel Co., 437 Union Trust Building, Pittsburgh.

H. J. Fuller of the hoisting sales equipment department of the Yale & Towne Mfg. Co. was elected chairman of the Electric Hoist Manufacturers' Association at the annual meeting on March 13. A. J. Barnes, New York manager and director of publicity for the Shepard Electric Crane & Hoist Co., was elected vice-chairman.

T. R. Harrison, formerly associated with the pyrometry department of the Bureau of Standards, and more recently with the Champion Porcelain Co. of Detroit, has assumed charge of the research department of the Brown Instrument Co., Philadelphia.

J. E. Brown, recently in the equipment engineering department of the plant engineer's office of the Western Electric Co., New York, has joined the New York district sales staff of the Pawling & Harnischfeger Co., Milwaukee. Prior to his connection with the Western Electric Co. Mr. Brown was with the Union Gas & Electric Co., Cincinnati.

F. L. Koethen of the Acheson Graphite Co., maker of Gredag lubricants, Niagara Falls, N. Y., delivered a short talk before the Cleveland section of the Association of Iron and Steel Electrical Engineers March 10, on the subject, "Recent Discoveries in the Theory of Lubrication and Their Application to Industrial Work."

Dwight E. Woodbridge, consulting and mining engineer, Duluth, has been appointed by the Governor of Minnesota a member of the committee to investigate the recent disaster at the Milford mine, Cuyuna Range, where 41 men were killed. Other members of the committee are: W. E. McEwan, ex-state labor commissioner; R. T. Bailey, Virginia, Minn.; Edward Smith, St. Louis county, mine inspector; Wilbur Van Evera, manager Killcrest and Portsmouth mines, Crosby, Minn.

F. E. Clark, formerly with the United States Steel Corporation, 71 Broadway, New York, has become associated with the Republic Carbon Co., Inc., manufacturer of carbon electrodes, Milwaukee. Mr. Clark assumes the duties of sales engineer.

OBITUARY

R. H. YORK, president Berkshire Mfg. Co., Cleveland, manufacturer of molding machines, died March 15, aged 60 years. He had been head of that company since it was established about 20 years ago but had not been active in its affairs for several years.

JOHN P. BECKER, vice-president Buffalo Wholesale Hardware Co., died March 16 of injuries received when struck by an automobile several days ago.

HENRY K. STAUFFER, vice-president Terminal Coal Co., Pittsburgh, died at his home in that city March 13. He was born in Altoona, Pa., 51 years ago and had been identified with the coal business since a young man. He was with B. Nicoll & Co., New York, in its coal sales department for 17 years, prior to joining the Pittsburgh Terminal Coal Co. in 1917. He was a member of the Fuel Administration during the World War, stationed at Fairmont, W. Va.

PHILO N. FRENCH, at one time an official of the Railway Steel Spring Co., died at Hot Springs, Ark., March 15. He was born in Racine, Wis., 64 years ago, but had been a resident of Pittsburgh since a child. His father, Aaron French, was the founder of the A. French Spring Co., Pittsburgh, with which he became affiliated prior to its absorption by the Railway Steel Spring Co. He was a graduate of Lehigh University.

JOHN KIRBY, vice-president and general superintendent of the William B. Pollock Co., Youngstown, Ohio, fabricating interest and blast furnace builder, died March 14, following a brief illness of pneumonia, aged 68 years. Mr. Kirby retired two months ago after 52 years' continuous service with the Pollock company, whose employ he entered when a boy of 15.

JOHN F. ALVORD, president Torrington Co., Torrington, Conn., and the Progressive Mfg. Co., that city,

died at his home, 34 East Fortieth Street, New York, on March 13, aged 63 years. Born in Torrington, he became connected with the business of his father, Charles Alvord, founder of the Excelsior Needle Co., later the Torrington Co. Mr. Alvord was also president of the Splitdorf Electric Co. of New Jersey, a director in the Wire Wheel Corporation of America, the Torrington National Bank, the Union Hardware Co. and other corporations.

ALBERT HIRSHHEIMER, founder of the LaCrosse Plow Co., LaCrosse, Wis., died March 11, aged 84 years. He was born in Germany and came to this country at the age of 10, locating with his parents in LaCrosse in 1856. He established a small smithy in 1864, which he developed into one of the largest plow works in the country. His eldest son, Harry J. Hirshheimer, is vice-president and general manager, and another son, Louis C. Hirshheimer, secretary-treasurer of the LaCrosse Plow Co.

MATTHEW CHAMPION, for 25 years general superintendent of the Champion Rivet Co., Cleveland, died March 10, aged 74 years. He was a brother of David Champion, president of that company.

WILLIAM COPELAND CODD, formerly vice-president of the E. J. Codd Co., Baltimore, and who in 1909 organized the Codd Tank & Specialty Co., died March 12, at his home in Baltimore.

To Hold State-Wide Safety Conference

A state-wide conference to consider practical methods of reducing accidents in industry will be held March 26, in the hall of the House of Representatives, Harrisburg, Pa., under the auspices of the Pennsylvania Department of Labor and Industry. There will be morning, afternoon and evening sessions. The Hon. Gifford Pinchot, Governor of Pennsylvania, and Dr. Royal S. Meeker, Secretary of the Department of Labor and Industry, will address the conference.

The preparation and use of accident statistics, plant safety organizations and the safety engineer's responsibility are among the subjects that will be discussed. Labor's and employer's views of accident prevention will be presented, and there will be an address on employer and employee responsibility in accident prevention. A feature of the conference will be a playlet entitled "Scene in a Tool Room," to be given by the employees of the Edgar Thomson Works of the Carnegie Steel Co., at the evening session, at which there will also be a demonstration of industrial lighting.

Those addressing the conference, or taking part in the discussion include the following safety engineers and directors: John Oartel, Carnegie Steel Co.; W. E. Jarrard, American Car & Foundry Co.; G. E. Sanford, General Electric Co.; Dr. L. E. Hastings, J. G. Brill Co., and C. H. McIllvaine, Budd Mfg. Co.

Slight Decrease in Operations in the Mahoning Valley

YOUNGSTOWN, March 18.—Loss in independent ingot production of the Mahoning Valley the past two weeks indicates that slowing down in new business is being reflected to some extent in operating schedules. Of 51 independent open-hearth furnaces in the Valley, 44 are melting this week, comparing with 48 two weeks ago and 46 last week. The Republic Iron & Steel Co. has two less furnaces on the active list than last week, while indications at the beginning of this week were that the Youngstown Sheet & Tube Co. might reduce its steel production before end of the week.

Rolling mill schedules average much the same as during the past few weeks, as losses in one direction are offset by gains in another.

Operation for the first time this week of six mills of the Thomas plant at Niles, by the Thomas Sheet Steel Co., increases the total number of active sheet mills to 106, of 120 units in the Valley. This represents the highest operating rate of Valley sheet mills in over a year, but it is unlikely that it will be maintained.

The Republic company suspended three bar mills this week, but restored to the active list two skelp mills which were idle last week. The Sheet & Tube company has added a tube mill to its active units, for a total of nine active mills of 11.

Plate, skelp and puddle mill operations continue virtually at a capacity rate.

The blast furnace schedule is unchanged, with 35 furnaces of 45 in the Youngstown district in blast.

Metallic Titanium on a Commercial Scale

A new and original method for the reduction of refractory ores has recently been developed, after several years of research, by Simon J. Lubowsky, research engineer Metal & Thermit Corporation, 120 Broadway, New York, which will undoubtedly be of great practical interest to the metallurgical industry. The principle of this new method of isolation is applicable on a commercial scale to many of the rare elements, although Mr. Lubowsky has carried his work to completion only with respect to metallic titanium. This metal, which has heretofore been obtainable only as a laboratory curiosity, is now to be had in larger quantities.

Mr. Lubowsky, who is now preparing a technical paper on his discovery, which will be presented before various scientific societies, received the degree of chemical engineer from the Carnegie Institute of Technology, Pittsburgh, and has been connected with the Metal & Thermit Corporation since 1915. During the war he was in charge of the chemical work carried on by this corporation.

Railroad Equipment Buying

(*Concluded from page* 904)

type and 6 switching type locomotives with the American Locomotive Co.

The Reading has placed 5 locomotives with the Baldwin Locomotive Works.

The Southern has awarded 1250 gondola cars to the Chickasaw Shipbuilding & Car Co. and 750 hopper cars to the Standard Steel Car Co.

The Rock Island is inquiring for 10 Mountain type locomotives.

The Atlantic Coast Line placed 50 ballast cars and 30 steel underframes for caboose cars with the Virginia Bridge & Iron Co., 10 express cars and 7 mail and baggage cars wtih the Standard Steel Car Co. and 20 Pacific type and 5 switching type locomotives with the Baldwin Locomotive Works.

The Seaboard Air Line ordered 25 ballast cars from the Rodger Ballast Car Co.

The Western Fruit Express is inquiring for 1000 steel underframes for refrigerator cars.

The Bessemer & Lake Erie is inquiring for 6 baggage and passenger cars, 3 baggage and mail cars and 3 baggage cars.

The Rock Island is inquiring for 8 dining cars and 5 buffet baggage cars.

The Pennsylvania Car Co. is low bidder on 1000 automobile cars for the Missouri Pacific.

The New York Central, which recently placed 15 dining cars with the Pullman Co., has increased the order to 27.

The Union Pacific Railroad is in the market for 10 locomotives.

The Southern Railway is inquiring for 5 locomotives.

The International Great Northern is getting prices on 6 locomotives.

The Florida East Coast Railroad has inquired for 25 locomotives.

The Skelly Oil Co., Tulsa, Okla., has ordered 35 insulated 8050-gal. tank cars from the Standard Tank Car Co.

STEEL AND INDUSTRIAL STOCKS

The range of prices on active steel and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalmers ..	45	46¼	Inland Steel	35	36½
Allis-Chal. pf. ..	94¾	94¾	Int. Har.	84	86
Am. B. S. & Fdy.	79	81	Int. Har. pf.....	107	107
Am. Can	113¼	116⅞	Lima Loco.	65⅛	65⅞
Am. Can pf.....	113	114¾	Midvale Steel ..	31⅛	31½
Am. Car & Fdy.	165	168	Nat.-Acme	8⅛	8⅛
Am. C. & F. pf..	120¾	120¾	Nat. En. & Stm.	33	33⅝
Am. Locomotive.	73⅜	76	N. Y. Air Brake	39½	41⅜
Am. Loco. pf....	118½	120	Otis Steel	10⅞	11⅝
Am. Radiator ..	99⅝	101	Otis Steel pf....	70½	72
Am. Steel Fdries.	37⅞	38½	Pressed Stl. Car	55	55
Am. Stl. Fd. pf..	104	104	Replogle Steel ..	10½	11
Bald. Loco.	121¼	124¼	Republic	54⅝	56½
Bald. Loco. pf...	115½	115½	Republic pf.	92	92¼
Beth. Steel	55⅝	57⅞	Sloss-Sheffield ..	60¾	62½
Beth. Stl. 7% pf.	94½	94⅞	Steel of Canada.	81	82¼
Beth. Stl. 8% pf.	108	108	Superior Steel...	34	34
Br. Em. Stl. 1 pf.	54	54	Un. Alloy Steel..	33	34
Chic. Pneu. Tool	83	84	U. S. Pipe.....	72	78¾
Colo. Fuel	30¾	35½	U. S. Pipe pf....	86½	87
Crucible Steel ..	60¾	63	U. S. Steel.....	101⅝	103⅞
Crucible Stl. pf..	90⅝	91	U. S. Steel pf...	118¾	119¼
Deere pf.	65	67¾	Vanadium Steel.	30½	31⅛
Gen. Electric ...	208½	226	W'house Air Br.	92⅛	94½
Gt. No. Ore Cert.	28⅞	29¾	Y'gstown S. & T.	66	67
Gulf States Steel	80	82½			

First Report of Columbia Steel Corporation

SAN FRANCISCO, March 15.—The Columbia Steel Corporation has been in operation for one year and its first annual report makes a very satisfactory showing considering the company's somewhat limited operations, due to building being in progress on its extensive plant and the small part of the works brought up to a producing standard.

The report was made by Wigginton E. Creed, the president of the corporation. It showed that after making deductions for operating charges, including $140,388 for depreciation, $182,954 for maintenance, replacements and repairs, and $46,587 reserved for possible contingencies, the gross income for the year was $1,032,298. Deducting from this total $256,666 for accrued interest on outstanding bonds and Federal income taxes aggregating $99,199, the net profits for the year amounted to $676,432.

In referring to the progress of work on the corporation's Utah properties, President Creed said the coal mine at Columbia has been developed to a daily production of 1000 tons and this could be easily increased with comparatively little expense. The mine has proved highly satisfactory as to both quantity and quality of coal. The company's iron property has been well opened and developed so that its output is now over 800 tons per day which is more than adequate to supply the blast furnace. Both the coke oven plant and the blast furnace at Ironton, near Provo, Utah, are nearly completed and the preliminary work of preparing them for operation, such as drying, heating and testing, has been started. This work will be completed within the present month.

The main plant at Pittsburg, Contra Costa County, Cal., is very nearly completed with rod, wire and nail mills already in operation. The sheet mill will be ready for operation before the close of the present month. Heretofore there has been no wire drawn on this coast and sheets have never been made here.

During the year the company acquired the plant and property of the Llewellyn foundry and mills at Torrance, near Los Angeles. This is regarded as a very valuable acquisition for furthering the company's business in the southern part of the State. Considerable improvement, particularly in the way of modern equipment, has been effected during the last few months.

The company's balance sheet shows total assets of $21,910,045, of which $3,611,677 represent current assets, as against current liabilities aggregating $1,285,037. Cash on hand and in bank amounted to $1,238,543. Those who served as directors during the past year were re-elected and at a meeting of the board, the same officers were re-elected for the coming year.

Worthington Pump Earnings

Last year the Worthington Pump & Machinery Corporation billed out $21,142,264 of goods to customers, against $14,722,916 in 1922 and $17,335,854 in 1921. Cost of sales, depreciation, etc., last year was $19,544,598, in 1922, $14,340,291, and in 1921, $15,791,544. The 1923 net income after interest, inventory adjustment and taxes amounted to $1,670,851; in 1922 it was $879,685, and in 1921 a loss of $188,630 was shown. During the past two years no dividend disbursement was made on common shares, but regular compensation was provided for preferred A and preferred B shareholders. Surplus after dividends last year was $660,052, whereas in 1922 there was a loss of $131,113. Due to an adjustment with the Government in regard to taxes for 1916, 1917 and 1918, the company last year, by the release of reserve funds was able to add $1,250,000 to its surplus account.

Earnings of Industrial Companies

The Chicago Pneumatic Tool Co. reports net income for 1923 of $812,037, after depreciation and taxes. This is equal to $7.13 per share on the outstanding capital stock, as compared with $505,818 net income in the preceding year and $4.44 per share on outstanding stock.

Net profits of the Bucyrus Co. for 1923 amounted to $1,299,932, after taxes and depreciation, equivalent after preferred dividends to $25.49 per share on $4,000,000 of common stock. This compared with net profit of $746,301 in the preceding year. The balance sheet shows cash on hand of $581,621. President W. W. Coleman sees prospects for good business in the current year, but does not expect conditions to be so generally favorable to the company as in 1923. W. H. Marshall and Andrew Fletcher have resigned from the directorate and in their place W. H. Crittenden and W. B. Goven of New York were elected.

The Hayes Wheel Co. reports gross sales for 1923 of $19,757,725 against $13,483,915 in 1922, and gross operating profits of $1,503,524 against $1,103,473. After allowing for interest and taxes there remained $1,302,066, equal to $6.60 a share earned on the 197,044 shares of no par value stock outstanding.

The J. I. Case Threshing Machine Co. reports gross sales for 1923 of $15,587,952 against $15,720,716 in 1922. Profit of $1,370,806 was reported after operating expenses, against $860,283 in the preceding year. Dividend payments on preferred stock recently were passed. Profit and loss surplus totaled $1,042,417 against $1,317,373, due to a deficit of $275,367 reported for 1923, after dividend payments.

Gross earnings of the United States Radiator Co. for 1923 totaled $2,275,300 against $1,743,176 in the previous year. Net operating profits were $2,096,730, against $1,586,381 in 1922, while net earnings, after reserves and charges, amounted to $1,859,772 against $1,386,582. Profit and loss surplus stood at $1,807,460 against $638,683 in the preceding year.

Net profits of the American Steel Foundries for 1923 totaled $7,661,065, the largest for any year in the company's history. This compared with a previous record of $5,025,666 in 1917. After dividend requirements, there remained $9.67 per share on 722,196 shares of common stock outstanding, as against $4.03 per share on a like amount in 1922. The balance sheet shows net current assets of $23,900,797 against current liabilities of $3,766,645.

Sales of the C. L. Best Tractor Co., San Leandro, Cal., for 1923 exceeded $4,000,000 and profit from operations was $703,921. This marks the best year in the company's history. Surplus as of Dec. 31, stands at $936,912.

The Taylor-Wharton Iron & Steel Co. reports net earnings for 1923 of $745,376 after expenses and taxes. This compared with an operating loss of $155,538 in 1922. Net income after interest and other charges in 1923 was $334,241. No dividends have been paid on common stock since December, 1921.

Net profits of the American Brake Shoe & Foundry Co. for 1923 were $2,727,097, after charges, depreciation and Federal taxes, compared with $2,120,539 earned in the preceding year.

The offering of 72,000 shares of the common stock of the Doehler Die Castings Co., which was advertised on March 6, was heavily over-subscribed, it was announced on the following day. Average yearly earnings for the nine-year period 1915-23 (1921 excepted) were approximately $389,000. It has been estimated that gross sales for 1924 will reach $10,000,000.

The consolidated balance sheet of the Ludlum Steel Co. as of Dec. 31, 1923, shows total assets of $4,809,757. Total in cash was $149,998, and profit and loss surplus was $2,210,486.

Net income of the Yale & Towne Mfg. Co. for 1923 reached $3,341,303, while net profits after taxes were $2,890,623. This compared with $2,406,664 reported in 1922. Surplus after dividends was $890,623.

The Union Tank Car Co. reports net earnings after depreciation in 1923 of $4,757,379, compared with $4,201,999 in 1922. Surplus after taxes and reserve for annuities was $4,105,399, against $2,996,643 in 1922.

Net profits in the Midvale Co. and subsidiaries for the nine months ended Dec. 31 were $336,205, or $1.68 per share on 200,000 shares of no par stock. Surplus as of Dec. 31 stood at $336,205.

Net profits of the Lima Locomotive Works, Inc., for 1923 totaled $2,402,604, after reserve for Federal taxes and contingencies, compared with $175,466 in the preceding year. Last year $1,562,709 was transferred to surplus, whereas the 1922 report showed a deficit after dividends of $144,750. Gross sales last year amounted to $20,286,867.

In statement issued Dec. 31, last, by the Simonds Saw & Steel Co., Fitchburg, Mass., to the commissioner of corporations of that State, total assets and liabilities of $6,678,441 are shown, which compare with $5,562,045 at the close of 1922. At the end of 1923 the company had accounts payable of $213,602, or $249,720 less than at the close of 1922, and reserves of $574,641 or $151,810 larger than the 1923.

At the annual meeting of the Graton & Knight Mfg. Co., Worcester, Mass., belting, held recently, the stockholders approved a reduction from $2,000,000 to $200,000 in the authorized capitalization represented by 80,000 shares of no par stock. The 1923 report showed after all charges and depreciation a net income of $269,676, which compares $14,028 for 1922. Sales for the past year aggregated $8,980,338, against $8,744,146 in 1923. The company eliminated its deficit and showed a surplus of $454,056. Total assets and liabilities are $11,603,311; at the close of 1922 they were $13,945,474.

The Atlas Tack Co., Fairhaven, Mass., made net profits in 1923 after all charges of but $555, which compares with $130,270 in 1922, and a loss of $299,114 in 1921. Net sales last year were $2,235,240, whereas in 1923 they were $2,367,237, and in the year before that $1,809,121. At the close of the year current assets were $1,240,118 and liabilities $427,607, while at the close of 1922 assets were $1,345,351 and liabilities $145,231.

The Sullivan Machinery Co. reports net income for 1923 of $1,266,379, as compared with $895,612 in the previous year. Surplus at the close of the year stood at $617,310, against $421,901 in 1922.

Net profit of the Babcock & Wilcox Co. for 1923 totaled $2,589,809, after depreciation and Federal taxes, comparing with $1,732,207 in the previous year. Income account showed surplus for the year of $839,818, as compared with $532,207 in 1922 and a deficit of $105,042 in 1921. Profit and loss surplus as of Dec. 31 stood at $5,063,400.

The Midland Steel Products Co., Cleveland, which became operative June 1, 1923, through a merger of the Parish & Bingham Co., Cleveland, and the Detroit Pressed Steel Co., Detroit, shows in its annual report for 1923 gross earnings of $1,634,838 and net earnings of $1,086,395. The current assets on Dec. 31 were $3,218,993, an increase of $1,187,727 for the year. President E. J. Kulas stated that the two plants are operating at capacity and that the March production is expected to break all previous records. President Kulas and other officers were reelected.

The White Motor Co., Cleveland, reports gross sales of $48,876,606 during 1923, an increase of $11,608,380. Net earnings amounted to $6,964,655 of which $4,964,655 was transferred to surplus, making present surplus $9,425,739. President Walter White in his annual report states that new buildings will be erected for the parts department, Cleveland repair department and engineering research department.

Stockholders of the Arcade Malleable Iron Co., Worcester and Springfield, Mass., have authorized an increase in the no par common stock capitalization of the company from 10,000 to 30,000 shares. Part of the new stock soon will be placed privately to provide additional working capital.

In conformity with its sinking fund provision, the Greenfield Tap & Die Corporation, Greenfield, Mass., has retired 2096 shares of 8 per cent preferred stock held in the treasury, bringing the capitalization down to $11,290,400.

Last year the Saco-Lowell Shops, Boston, maker of textile machinery, spent $1,348,535 for plant additions and allowed $560,490 for depreciation. At the close of 1923 the company had $1,020,470 cash on hand, which compares with $525,711 at the end of 1922 and $2,081,677 at the close of business in 1921. Surplus, after dropping from $6,108,871 in 1921 to $2,091,382 in 1922, further decreased to $1,768,817 last year.

Net earnings of the Independent Pneumatic Tool Co. for 1923 totaled $1,467,118 before taxes. This compared with $643,169, in the preceding year. After payment of dividends and reserve for taxes there was a surplus last year of $253,785.

Net income of the New York Air Brake Co. for 1923, after all charges and taxes, amounted to $2,526,487, equivalent to $8.42 per share on outstanding stock, as against $958,742 in 1922. Current assets as of Dec. 31, last, stood at $8,550,102, current liabilities at $1,284,561 and net working capital at $7,265,541.

Guy E. Tripp, chairman of directors, Westinghouse Electric & Mfg. Co., in connection with the recent declaration of a 10 per cent stock dividend, stated that figures for the ten months ended Jan. 31, indicate that the volume of business during the fiscal year will approximate $150,000,000. He also stated that directors have approved a plan for additional manufacturing facilities to be provided during the next two years. It is estimated that income available for dividends and other purposes for the fiscal year ended March 31 will be about $16,000,000, and current assets will be close to $125,000,000.

Net profits of the Superior Steel Corporation for 1923 amounted to $734,878, after depreciation and Federal taxes. This compares with net profits of $515,862 in 1922. Profit and loss surplus stood at $803,010 as against $361,852 in the preceding year.

The Penn Seaboard Steel Corporation, reports loss from operations of $33,007, as compared with a loss in 1922 of $515,447. Current assets as of Dec. 31 were $2,103,361 and current liabilities $1,645,462.

The Wheeling Steel Corporation has declared the regular quarterly dividends of 2 per cent on preferred A and 2½ per cent on preferred B stock, both payable April 1 to stockholders of record March 12. The annual meeting of stockholders is to be held April. 27.

Industrial News Items

Stockholders of the Consolidated Steel & Iron Corporation, with offices in Terra Haute, Ind., and St. Louis, have elected officers and directors for the ensuing year as follows: F. J. Stuart, chairman of the board of directors; H. A. Brereton, president and treasurer; E. J. Schroeder, vice-president; F. F. Rimsa, secretary and assistant treasurer. Directors: A. B. Neumann, Chicago; A. T. Hollenbeck, Jefferson City, Mo.; W. R. Mayne, St. Louis; L. E. Waterman, Terre Haute, Ind.; N. G. Wallace, Terre Haute; A. R. Fraser, Cleveland; H. A. Sicker, West Lafayette, Ohio; E. J. Rose, Chicago; August Borchelt, St. Peter, Ill.; S. C. McKeen, Terre Haute; George J. Nattkemper, Terre Haute. The Consolidated Steel & Iron Corporation some time ago took over the properties of the Hoosier Rolling Mill Co. and the Terre Haute Auto Spring Co. at Terre Haute, and at present is taking steps to finance the completion of a projected steel plant at Steelton, near Terre Haute.

Assets of the bankrupt Sizer Steel Co. were to be put under the hammer March 17, according to an order signed by Federal Judge John R. Hazel, and sale of assets was to have been made March 12, but at the request of the receivers, was postponed.

A preliminary certificate of dissolution has been filed by the American Metallic Cartridge Co., Inc., Bridgeport, Conn. Claims may be sent to Shearman & Sterling, 55 Wall Street, New York.

A final certificate of dissolution has been given the Hartford Electric Steel Corporation, Hartford, Conn., claims having been met and the remaining assets distributed among the stockholders.

Don C. McCord and Maurice L. Rothschild, who acquired control of the Apperson Brothers Automobile Co., Kokomo, Ind., over a year ago, have announced that arrangements for financing the coming season's production have been completed, and that the company plans to increase the production budget, which was outlined to creditors at a meeting last November. At that time it was agreed to manufacture 728 automobiles before Aug. 1, 1924. The new production budget will enable the company to better its inventory by $598,000 and liquidate its inventory and commitments by $536,000 and otherwise place the organization on a firmer financial footing.

John T. Walsh of Buffalo has been appointed receiver in bankruptcy for the Niagara Screw Co., according to an order signed by Federal Judge John R. Hazel. The order was issued in response to a petition by Saperston, McNaughton & Saperston, for one of the creditors, Alonzo R. Clarkson.

The Columbia Phonograph Co., Inc., Bridgeport, Conn., formerly the Columbia Graphophone Co., recently taken out of receivership by Judge Learned Hand, is headed by H. L. Willson. W. C. Fuhri, an original Columbia official, will be vice-president and general sales manager. The manufacturing and assembling will be concentrated in the Bridgeport factories, plants at Baltimore and Toronto being discontinued.

The Weighing Machine Co., manufacturer of computing scales and automatic weighing machines, previously situated at Topeka, Kan., has moved to Kansas City, Mo., and will occupy a new three-story factory of 30,000 sq. ft. floor space

at 815-19 East Seventeeth Street. Annual output computed in dollars reaches nearly one million. W. W. Davis is president and C. D. Scott, secretary.

The trustees in bankruptcy have sold to Dr. Philip Castleman, 483 Beacon Street, Boston, the Wollaston Foundry Co., Wollaston, Quincy, Mass. It is not known what disposition of the plant is to be made.

Combustion Utilities Corporation Expands

The Combustion Utilities Corporation, New York, announces that, through Henry L. Doherty & Co., it has acquired the Surface Combustion Co.

At present, it is planned that both of the companies consolidated shall maintain their own identities. The Surface Combustion Co. will continue to manufacture its own specialties and will soon announce plans for amplifying its medium priced furnaces.

Receiver for Phoenix Iron Works Co.

Samuel E. Duff, an engineer with offices in the Magee Building, Pittsburgh, was appointed by Judge W. H. S. Thomson in United States district court, Pittsburgh, March 11, as receiver of the Phoenix Iron Works Co., Meadville, Pa. The action was taken after an answer to a bill of complaint had been filed by the company, in which the company joined in a petition to have a receiver appointed. The suit in equity was brought by John D. Sayer of New York, a stockholder of the company.

Trade Changes

The Wickwire-Spencer Steel Corporation has appointed Waldo, Egbert & McClain of Buffalo, and Boston as exclusive sales agents for Wickwire machine-cast pig iron produced at Buffalo. The arrangement, which was effective March 1, means that Waldo, Egbert & McClain will handle the sales of Wickwire foundry and malleable iron, basic sales continuing to be handled by the Wickwire-Spencer Steel Corporation.

The Reed-Prentice Co., Worcester, Mass., has established a sales office at No. 204 Machinery Hall, Chicago, in charge of Lane Scofield.

The Atlantic Insulated Wire & Cable Co., Stamford, Conn., has been purchased by the Rome Wire Co., Rome, N. Y., and the entire works will be removed to Rome. It will be necessary to continue operations at the Stamford plant for several months.

Grossman Brothers-Parelskin-Grodin, Inc., Milwaukee, dealers in salvaged materials and equipment, and industrial buildings from liquidation, have changed their corporate title to the Manufacturers' Sites Corporation of Milwaukee. Some time ago it acquired extensive manufacturing, elevator and milling property in Milwaukee, the equipment of which has been salvaged and the buildings are now being offered for lease or sale.

Neff, Kohlbusch & Bissell, 1045 West Washington Boulevard, Chicago, have been appointed exclusive representatives in the Chicago district for the sale of machine tools manufactured by the Gisholt Machine Co., Madison, Wis.

The Seamless Hollow Ball Co., Baltimore, has changed its name to the Hollow Ball Co., Inc.

The Consolidated Machine Tool Corporation of America has moved its general offices from 565 Blossom Road, Rochester, N. Y., to Wilmington, Del.

The Steamship Fuel Corporation, 33 Rector Street, New York, has opened a sales office at 872-76 Ellicott Square, Buffalo, J. Fred Morlock in charge.

The Cleveland Stone Co., which acquired the Sterling Grinding Wheel Co. of Tiffin, Ohio, about two years ago, announces the removal of the general offices of the Sterling company to Cleveland, effective April 1. The Sterling plant has been equipped with additional kilns, this being the third time production has been increased since the acquisiton of the plant.

The Dale Machinery Co., Chicago, has been appointed exclusive sales agent in Chicago territory for the Rock River Machine Co., Janesville, Wis., manufacturer of punches and shears, bending rolls, gate shears, bar shears, and multiple punches.

Directors of the Marlin-Rockwell Corporation have completed the purchase of the Gurney Ball Bearings Co., Jamestown, N. Y., subject to the approval of stockholders at a meeting to be held March 28. In exchange for these assets the Marlin-Rockwell company will give $2,722,800 in 7 per cent cumulative preferred stock and 133,683 shares of no par common stock.

Plans of New Companies

J. H. H. Voss, Inc., 154 Nassau Street, New York, has been incorporated with $100,000 capital stock to manufacture valves and other steam specialties for the ice manufacturing trade. Mr. Voss has been in this line for several years and is manufacturing by contract, but is now looking for a plant where the company can do its own work.

The Kinodyne Radio Corporation, 522 Fifth Avenue, New York, incorporated with capital stock of $100,000 purposes to manufacture wireless instruments and equipment. A. D. Buzby, who is connected with Wellman, Seaver & Morgan, New York, heads the company.

Curtis-McGee, Inc., New York, has been organized with $75,000 capital stock to manufacture a new appliance for printing presses. The organization is in the formative stage and no plans have been decided upon for manufacturing. J. J. Curtis, B. McGee and J. P. O'Brien, of the Stillman Appellate Printing Co., 200 William Street, are the principals.

Reiche & Penner, Inc., 678 Lexington Avenue, Brooklyn, has been incorporated with capital stock of $25,000 to operate a general iron and steel works. F. and E. Penner and R. C. Maass head the company.

Henry Gardner, Guiterman & Co., Inc., New York, have been organized with capital stock of $100,000 to deal in pig iron, tin, copper, lead, rubber and similar products. The company is associated with Henry Gardner, Ltd. of London. Until May 1 offices will be located at 25 Broadway; after that they will be at 120 Broadway, Room 2904.

L. R. Connett & Co., 30 Church Street, New York, has been incorporated with $100,000 capital stock to operate a ship repair works and to charter barges, scows, etc. L. R. Connett is president and John B. Allen, vice-president.

The Electric Safety Razor Corporation of America, Woolworth Building, New York, has been incorporated with $500,000 capital stock to manufacture electric safety razors. Floor space has been leased for assembling and, since parts are made by an outside concern, no equipment is required. However, the company will be in the market for brass, copper wire, etc. Production of 1000 units per day is planned. H. B. Cheu is general manager.

The Roman Ornamental Metal Co., Inc., 39-41 South Sixth Street, Newark, N. J., has been incorporated with $100,000 capital stock to acquire the business of the Roman Ornamental Metal Co., which has been organized for several years. Larger production is being planned. H. Lowengrub and P. Farb head the company.

G. R. S. Products, Inc., 149 Cady Street, Rochester, N. Y., has been organized to manufacture household appliances and motor products. It will operate the plant of the Federal Signal Co., Albany, N. Y. What equipment will be required is not yet known. A. H. Renshaw is president, W. W. Salmon, vice-president, and H. W. Chamberlain, treasurer.

The Perfection Diaphragm Co., Inc., 192 Bowery, New York, has been organized with capital of $5,000, to manufacture diaphragms for gas heaters. It has a factory at 223 Broadway, Astoria, N. Y.

Universal Art Novelty Co., 15-21 Wood Avenue North, Linden, N. J., has been organized to manufacture clocks, console sets, etc. Its shop is equipped and in full operation. Frank D. Beteta is president.

The North Western Milling Equipment Co., care of P. H. Sackett, 3445 Hennepin Avenue, Minneapolis, has been organized to deal in machinery.

The Means Stamping Co., Saginaw, Mich., has organized to conduct a job shop for manufacturing light stampings and metal specialties, principally for the automotive trade. It has leased a plant, installed equipment and is now ready for operation. Ralph P. Means, president and general manager, has had 15 years' experience in this line, having formerly been connected with the Crosby Co., Buffalo, Benjamin Electric Mfg. Co., Chicago, and the Carde Stamping & Tool Co., Saginaw.

The Steam Vehicle Corporation of America, 800 City Bank Building, Syracuse, N. Y., is planning to continue production on Stanley cars at its plant in Newton, Mass. A steam bus also is being designed and will be manufactured later. The company also has a plant at Canastota, N. Y. J. E. Gramlich is general manager.

The Mott Wheel & Rim Co., Jackson, Mich., organized with $10,000 capital stock to manufacture automobile rims, steel felloes, and wire wheels, has leased the plant formerly occupied by the Aspinwall-Drew Co. It is successor to the Mott Wheel Works, Jackson. O. W. Mott is president.

Machinery Markets and News of the Works

BUYING LIGHT

Single Tools Predominate—Inquiries Numerous but Sales Slow

Prospective Buying by Steel Mills Commands Attention—Railroad Purchases Expected

A moderate volume of single tool orders from scattered sources, with more cheerful sentiment in some centers because of prospective business, seems to be the present status of the machine tool trade. Demand for punching and shearing machinery has been noted.

Prospective buying by the steel mills is commanding attention in Chicago and Pittsburgh. A list issued by the Youngstown Sheet & Tube Co. for its Indiana Harbor plant, includes an 18-in. and a 30-in. engine lathe, a two-spindle centering machine, a drill grinder and a 600-ton wheel press. Inquiries from the Inland Steel Co. and the Illinois Steel Co. are pending. Considerable equipment will be bought for the Gary Works of the National Tube Co., action on this list not being expected, however, for two or three months. These orders probably will be placed at Pittsburgh. Pending also is the list of the American Sheet & Tin Plate Co. for equipment for several plants where improvements are in progress.

A new list by the Westinghouse Electric & Mfg. Co., East Pittsburgh, is expected shortly. This company has bought against its list during the week. The General Electric Co., Schenectady, is inquiring for several punches and shears, a bending roll and other machine tools for its new switchboard plant being built in Philadelphia.

At Cincinnati automotive buying continues the leading factor in what business there is. Railroad buying is expected to get under way in the coming week with purchases by the Santa Fé and Southern Railway systems. The American Locomotive Co. is reported to be about to close for a number of machines, as is also the Ford Motor Co.

The Santa Fé has added a 16-in. x 6-ft. portable lathe to its pending list. The Chicago, Milwaukee & St. Paul has shortened and revised its list, which was published in THE IRON AGE of Feb. 7, and will buy used equipment wherever possible.

Railroad buying included 16 Boye & Emmes lathes by the New York Central Railroad. Single machines were purchased by the Missouri Pacific, Central Railroad of Georgia and the Boston & Maine railroads. The Boston & Albany and the Central Vermont also made purchases.

The Chinese Eastern Railway is reported to have purchased about $200,000 worth of machine-shop equipment, a New York exporting company furnishing a milling machine, shaper and drill press out of local stock and several lathes out of stock in China. Some of the business went to Germany.

New York

NEW YORK, March 18.

THE New York Central Railroad has placed an order for 16 Boye & Emmes lathes, 18 to 24 in., 12 of which are for Western lines and the remainder for the Eastern division. Other railroad buying includes a 100-ton bushing press and a 400-ton double car-wheel press ordered by the Missouri Pacific from an Eastern company. The Western Wheeled Scraper Co., Aurora, Ill., bought a 6-spindle arch bar drilling machine. The Central Railroad of Georgia has bought a locomotive axle turning lathe. The Wickes Boiler Co., Saginaw, Mich., has bought a 125-ton hydraulic riveter. The General Electric Co., Schenectady, is inquiring for a bending roll, several punches and shears and other machine tools for its new switchboard plant being built in Philadelphia. The Chinese Eastern Railway, according to a report received in the United States, has purchased about $200,000 worth of machine-shop equipment. A New York exporting company sold a milling machine, shaper and drill press out of stock here and several lathes out of stock in China. Some of the business went to Germany.

The Otis Elevator Co., Eleventh Avenue and Twenty-sixth Street, New York, is concluding the purchase of land at Newman and Forsyth Streets, Jacksonville, Fla., 54 x 105 ft., and is said to be planning for a new factory branch.

Plans are now available at the Bureau of Yards and Docks, Navy Department, Washington, for a pneumatic ash-handling system for installation at the New York Navy Yard, for which bids will soon be called, specification 4959.

The Public Works Tenders Board, Wellington, New Zealand, will receive bids until July 29 for equipment for the Lake Coleridge power scheme, Section 146, including two water turbines complete with governors; set of spare parts and tools; two main valves; two electric generators complete; one spare set of field coils; one spare set of armature coils and insulating materials; one spare set of field brush-holders and brushes; one set of spanners and special tools; one complete bearing shell for each type of bearing, all as per specifications on file, No. S. M. 186.

The Wilson Mfg. Co., 137 Grand Street, New York, manufacturer of tools, etc., has inquiries out for one or more power presses, Bliss and V. O. type.

The Columbia Corrugated Co., Inc., 50 West Twentieth Street, New York, manufacturer of corrugated paper boxes and containers, has leased the five-story building, 96 x 172 ft., on Eleventh Avenue, between Twenty-seventh and Twenty-eighth Street, for a new plant and will take immediate possession.

G. W. Ethbert, 355 East Sixteenth Street, Brooklyn, has plans for the erection of a one-story cold storage plant at 746-62 East Forty-second Street. J. W. Magrath, 367 Fulton street, is architect.

The Crucet Mfg. Co., 292 Fifth Avenue, New York, manufacturer of electric lighting fixtures, lamps, etc., has acquired a five-story building at 18 West Twenty-third Street, and will occupy two floors for a new plant.

The Consolidated Gas Co., 130 East Fifteenth Street, New York, is arranging for a security issue of about $50,000,000, of which approximately $40,000,000 will be used for the construction of the proposed power plant for its Edison Co. interests at the foot of East Fourteenth Street.

William C. Durant, head of Durant Motors, Inc., 1819 Broadway, New York, and other officials of the company, have organized the Eagle Engine Works, Inc., under Delaware laws, with capital of 2,000,000 shares of stock, no par value, to establish a plant for the manufacture of automobile engines and other power equipment for the Eagle-Six, a new automobile of the company.

The Government of Brazil, Rio de Janeiro, is planning the construction of an electric power plant for the operation of a new iron and steel works in the Doce River Valley section, State of Minas Geraes. The American Consulate Office, Rio de Janeiro, Edwin V. Morgan, consul, has information regarding the project.

The United States Cast Iron Pipe & Foundry Co., 71

Broadway, New York, is completing plans for extensions in its plant at Burlington, N. J., including the installation of 10 additional machines to operate under the de Lavaud process, of which an inital unit of five are expected to be ready for service during the year.

The Erie Railroad Co., 50 Church Street, New York, plans to rebuild the portion of its coal pocket and equipment at the foot of Pavonia Avenue, Jersey City, N. J., destroyed by fire, March 13 with loss estimated at $17,000.

The Asiatic Petroleum Co., Bergen Point, Bayone, N. J., has had plans prepared by the Moody Engineering Co., 90 West Street, New York, for a new one-story power house to cost $25,000.

Fire, March 10, destroyed a portion of the crushing plant and ore mill of the Replogle Steel Co., Ogdensburg, N. J., with loss estimated at $40,000 including rock crushers and other equipment.

The Public Service Corporation, Public Service Terminal, Newark, has acquired a portion of the former plant of the Rogers Locomotive Works, Paterson, N. J., on site 285 x 360 ft., improved with foundry and boiler plant, for $110,000. It is proposed to remodel for use by the mechanical department of the Public Service Railway Co., a subsidiary.

The Agar Mfg. Corporation, 167 Forty-first Street, Brooklyn, manufacturer of corugated fiber and paper products, has purchased the former Caledonian paper mill property at Whippany, N. J., heretofore held by the United Boxboard Co., New York, and plans the erection of a new mill for the manufacture of corrugated paper, to cost approximately $90,000. The previous mill was destroyed by fire a number of years ago and never rebuilt.

John McWilliams & Sons, Jersey City, N. J., is inquiring for a 150-hp. locomotive type boiler of 150 lb. pressure.

P. C. T., 701 Marshall Street, Elizabeth, N. J., is inquiring for crushing rolls and Newago screens.

The Biffert Enameling Co., Inc., Newark, has leased a portion of the building at 365-71 Ogden Street for a new plant. Oscar Biffert heads the company.

John Sturm & Son, Inc., 32 Commercial Street, Newark, manufacturer of wagons, parts, etc., has filed plans for extensions in its plant to cost $38,000.

The Board of Water Commissioners, Hammonton, N. J., will receive bids until March 24 for electric-operated pumping equipment and accessory apparatus for the municipal waterworks. Joseph A. Baker is town engineer.

M. D. Goodman, dealer, 185 Bigelow Street, Newark, N. J., is in the market for a 10 or 15-ton used electric locomotive crane, 220 volts d.c., boom 30 to 45 ft. long, and a used 45-in. magnet.

Philadelphia

PHILADELPHIA, March 17.

A. & G. BOEHM, Fifteenth and Federal Streets, Philadelphia, manufacturers of sheet metal products, have acquired the plant of the Delaware Metal Refining Co., at Eighteenth Street and Washington Avenue, for new work.

The Columbia Steel Equipment Co., Third and Wingehocking Streets, Philadelphia, manufacturer of steel furniture, etc., will take bids at once for a one-story addition, 100 x 105 ft. J. Frank Clark, 23 South Fifteenth Street, is architect.

The Stelwagon Mfg. Co., Nineteenth Street and Washington Avenue, Philadelphia, manufacturer of roofing products, has awarded a general contract to L. Rosengarten, 4742 Market Street, for a new plant to cost $25,000.

H. S. Getty & Co., Inc., 1539 Cabot Street, Philadelphia, manufacturer of hardware products, will also build a foundry, in connection with machine shop, previously announced. Walker & Carswell, 1015 Chestnut Street, are architects.

The Philadelphia Rapid Transit Co., 810 Dauphin Street, Philadelphia, through its subsidiary, the Rapid Transit Construction Co., has awarded a general contract to H. E. Baton, 1713 Sansom Street, for a new carhouse and shop at Twentieth and Johnston Streets, to cost about $35,000.

Plans have been filed by the Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, for its two-story repair and maintenance shop, 60 x 100 ft., at Twenty-sixth and Christian Streets, to cost $85,000 with equipment. The company will also begin the construction of an addition to its power station at Sixty-fifth and Paschall Streets, including improvements in the present building. A new power house will also be built at Main and Green Lane Streets, for which plans have been drawn by John T. Windrim, Commonwealth Building, architect.

Fire, March 11, destroyed a portion of the plant of the American Road Machinery Co., Kennett Square, Pa., including woodworking department, with loss estimated at $30,000 including equipment. It is planned to rebuild.

Manual training equipment will be installed in the new high school to be erected at Lambertville, N. J., estimated to cost $160,000, for which bids will soon be asked on a general contract by William A. Klemann, First National Bank Building, Trenton, N. J., architect.

The John A. Roebling's Sons Co., Trenton, N. J., has acquired at public sale the plant and equipment of the Duncan Mackenzie's Sons Co., Clark Street and Hamilton Avenue, manufacturer of machinery, wire products, etc. The new owner will use the property in connection with its plant, remodeling the foundry which has been idle for some time.

Fitzgibbon & Crisp, Inc., Calhoun Street, Trenton, N. J., manufacturer of automobile bodies, has awarded a general contract to the N. A. K. Bugbee Co., 206 East Hanover Street, for a one-story addition, to cost $17,500 exclusive of equipment.

The Board of Education, Scranton, Pa., plans the installation of manual training equipment in the addition to the technical high school at Adams and Gibson Avenues, estimated to cost $500,000. J. D. Hughes is secretary.

The New Cumberland Paper Box Co., New Cumberland, Pa., will begin the erection of an addition to cost $40,000 including equipment.

The Glen Alden Coal Co., Exeter, Pa., operating at the former works of the Exeter Machine Co., for the manufacture of mine cars, mining equipment, repairs, etc., has purchased adjoining property and plans the erection of a machine shop and other extensions.

T. L. Tasse, York, Pa., is having plans drawn for a three-story ice and cold storage plant, 37 x 133 ft., at 156 North George Street, for which bids will be asked at once. Edward Leper, York, is architect.

The Pennsylvania Power & Light Co., Allentown, Pa., will soon begin superstructure work on its proposed hydro-electric power plant at Hawley, Pa., to cost $500,000 with machinery. It has opened negotiations for the purchase of the municipal electric plant at Weatherly, Pa., and plans extensions and the installation of additional equipment in this district.

The Board of School Directors, Chadds Ford, Pa., is taking bids on a general contract until March 27 for the construction of a consolidated vocational school for the different communities in this section, estimated to cost $150,000. V. T. Ritter, North American Building, Philadelphia, is architect.

The Lehigh & New England Railroad Co., 437 Chestnut Street, Philadelphia, operated by the Lehigh Coal & Navigation Co., same address, is taking bids on a general contract for a new engine house, with machine and repair shops, at Tamaqua, Pa., estimated to cost $250,000 with equipment. It is also planning the erection of a new freight station in the vicinity of Lansford, Pa., with material-handling equipment installation.

Fire, March 8, destroyed the Oak Hill coal breaker and separating plant of the Pine Hill Coal Co., Minersville, Pa., with loss estimated at $100,000 including equipment. It is planned to rebuild.

The Quality Tools Corporation, New Wilmington, Pa., recently incorporated with capital stock of $25,000 to manufacture tools, has construction under way on a plant. It is in the market for equipment. In addition to handling mechanics' tools, part of which it will manufacture, the company will produce pneumatic chisels, beading tools, rivet punches, etc.

Buffalo

BUFFALO, March 17.

PLANS are being completed by the Genesee Bridge Co., 666 Plymouth Avenue, Rochester, N. Y., for a one-story steel fabricating plant at 344-60 West Avenue, estimated to cost $65,000, on which work will soon begin.

Officials of the American-La France Fire Engine Co., Elmira, N. Y., have organized the Ward-La France Truck Corporation, as a subsidiary company, to manufacture motor trucks and parts. It is capitalized at $100,000 and 1596 shares of common stock no par value. A. W. La France and J. G. Grossman head the new organization.

The International Paper Co., 100 East Forty-second Street, New York, is considering the installation of hydro-electric power equipment at three of its mills in the vicinity of Watertown, N. Y., to convert the plants from water power to electric power operation.

The Marlin-Rockwell Corporation, Plainville, Conn., is completing plans for the purchase of the plant and business

The Crane Market

The overhead crane market is not particularly active. Although only a few awards have been made in the past week, a fair volume of business is pending, including some sizable lists. In the Chicago territory are two large inquiries for overhead cranes. One of these is from the Atchison, Topeka & Santa Fe, which is asking for seven cranes for its San Bernardino, Cal., shops: One 250-ton, 84-ft. 6-in. span, 7-motor; one 175-ton, 85-ft. span, 7-motor; two 15-ton, 81-ft. 4-in. span, 5-motor; one 15-ton, 41-ft. span, 3-motor; one 15-ton, 35-ft. 2-in. span, 3-motor, and one 10-ton, 42-ft. 6-in. span, 3-motor, overhead traveling cranes. Another Chicago district inquiry is from the Gary Tube Co., Gary, Ind., which is in the market for 19 electric traveling cranes, including 5-ton, 10-ton, 20-ton and 25-ton machines, as well as a number of small jib cranes.

The Westinghouse Electric & Mfg. Co., Pittsburgh, which recently closed on two 5-ton cranes for East Pittsburgh and a 7½-ton crane for Sharon, Pa., is still in the market for 12 cranes for the Sharon, Pa., plant, the list including five 5-ton, four 15-ton, one 30-ton, one 50-ton and one 75-ton cranes. In addition there are two 3-ton and a 5-ton crane pending for East Pittsburgh. The National Tube Co. has obtained prices for estimating purposes on a large list of cranes for the Homestead works. The Pittsburgh Plate Glass Co. has closed on a 5-ton crane for its Creighton, Pa., plant. Appropriations for purchase of many of the cranes for which inquiry has been made are reported to have been made, so that further large purchases are expected shortly.

In the New York district, one of the outstanding inquiries is that of the General Electric Co., which has been pending for some time. The 10-ton overhead crane inquired for several months ago by the Thompson-Starret Co., for the Libby-Owens Bottle Co., Toledo, Ohio, will probably be purchased by Lockwood-Greene & Co., Boston. A small electric crane is involved in an addition to the plant of the Potter Drug & Chemical Corporation, 129 Medford Street, Malden, Mass.; architect, Robert H. Wambolt, 6 Beacon Street, Boston.

Among recent purchases are:

Citizens Gas Co., Indianapolis, Ind., a 20-ton, 50-ft. boom locomotive crane from the Link-Belt Co.

O'Hara Contracting Co., Brooklyn, N. Y., a 7-ton locomotive crane from the Orton & Steinbrenner Co.

Republic Creosoting Co., Indianapolis, Ind., a 15-ton locomotive crane from the American Hoist & Derrick Co.

Stone & Webster, Boston, reported to have purchased a 20-ton locomotive crane from the Ohio Locomotive Crane Co.

Blaw-Knox Co., Blaw-Knox, Pa., two 10-ton, 70-ft. span overhead traveling cranes from the Whiting Corporation.

Carnegie Steel Co., two 15-ton, 61-ft. span overhead traveling cranes, equipped with magnets, for its Duquesne works, from the Morgan Engineering Co.

Western Wheeled Scraper Co., Aurora, Ill., two 5-ton electric traveling cranes from the Northern Engineering Works.

Central of Georgia Railway, Savannah, Ga., two 1-ton hand power jib cranes and a 3-ton pneumatic jib crane from the Whiting Corporation.

New York, Chicago & St. Louis Railroad, Cleveland, three 2-ton hand power jib cranes from the Whiting Corporation.

Old Ben Coal Co., Chicago, three 20-ton hand power traveling cranes from the Whiting Corporation.

Stone & Webster, Inc., Boston, a 30-ton overhead crane for a New England power project from the Whiting Corporation.

Norfolk & Western Railway Co., Roanoke, Va., two 5-ton, 18-ft. span, one 10-ton, 30-ft. span and two 2-ton, 18-ft. span, 3-motor overhead cranes from an Eastern crane builder.

City of Toronto, Ont., a 10-ton, 45-ft. boom gasoline driven, locomotive crane with ¾-cu. yd. bucket, from John T. Hepburn, Ltd., Toronto.

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of the Gurney Ball Bearing Co., 16 Scott Street, Jamestown, N. Y., for $2,500,000, and will consolidate with its present ball bearing manufacturing subsidiary. It is proposed to expand the facilities to accommodate the consolidated organization.

The Linde Air Products Co., 155 Chandler Street, Buffalo, has awarded a general contract to the J. W. Cowper Co., Fidelity Building, for its one-story addition, 72 x 80 ft., to cost $25,000.

Fire, March 9, destroyed a portion of the plant of Vincent & McDonald, Gloversville, N. Y., manufacturers of toys, with loss estimated at $30,000 including equipment. Rebuilding plans are under consideration.

In connection with the recent merger of the Syracuse Lighting Co., 421 South Warren Street, Syracuse, N. Y., and the Onondaga Utilities Co., of the same city, plans are under way for the construction of a new steam-operated electric generating plant. J. C. DeLong is president.

The Art Work Shop, 828 East Ferry Street, Buffalo, manufacturer of metal fittings, door handles, etc., for closed automobiles, is having plans prepared for a new factory at the rear of its present works to more than double the capacity.

The Rochester Ice Cream Co., foot of White Street, Rochester, N. Y., is planning for the construction of an ice-manufacturing and refrigerating plant in connection with a proposed factory at Geneva, N. Y., to cost $100,000.

The Acme Road Machinery Co., Salem, N. Y., plans the purchase of an engine lathe and other equipment.

The Ford Motor Co., Detroit, is reported to have allowed options to expire on property at Buffalo, recently secured with view to erecting an assembling plant, owing to unfavorable land conditions, and will purchase a site in another locality in northern New York. The plant will cost approximately $500,000.

The Power Corporation of New York, Northern New York Trust Building, Watertown, N. Y., plans for extensions in its plant and system, including the construction of a steel tower transmission line from Rome to Boonville, N. Y., about twenty-five miles.

The municipal power plant, Jamestown, N. Y., will be doubled and the Board of Public Works will advertise for bids to be opened April 3 on three horizontal tubular boilers of 200 hp. capacity each, two horizontal tubular boilers, 150 hp. each, five Jones underfeed stokers, two fan engines, two fans, two feed water heaters, three boiler feed pumps, one condensate pump and motor, two vacuum air pumps, three induction motors, four direct current generators and one steam turbine.

The W. A. Case & Son Mfg. Co., Buffalo, manufacturer of plumbers', steamfitters', mill and factory supplies, has purchased the Warner building at 72-90 St. Paul Street, Rochester. It will utilize the first three floors and basement immediately and will ultimately occupy the entire 114,000 sq. ft. of floor space.

Plans are under way by the Jamestown Metal Desk Co., 88 Blackstone Avenue, Jamestown, N. Y. for the construction of another addition to its plant. It will be one story of reinforced concrete, 125 x 262 ft., and estimated to cost $35,000. Considerable metal working machinery, transmission and conveying equipment will be required.

New England

BOSTON, March 17.

THE machine tool market, from the point of bookings, continues listless. Inquiries continue, swelling the aggregate prospective business to sizable proportions. Local machinery dealers feel the chances of a buying movement starting soon are brighter than for a month or more, which is based on a slightly higher ratio of operation and volume of product by the average machine shop. The Boston & Maine Railroad Billerica and Concord shops, for instance, heretofore operating on a five-day per week schedule, have resumed a 48-hr. week. Numerous industrial plants also have either increased working hours or taken on additional help. The increasing activity among shops is attested by the comparatively active demand for small tools and parts.

In addition to punch and shear equipment recently purchased, the Boston & Maine has closed for a 40-in. upright drill, the Boston & Albany Railroad has taken a shaper and a triple bolt cutter, while the Central Vermont has bought an axle lathe and a car wheel borer. The Maine Central has made no move to cover on its list. Other business consists of a new or used tool here or there.

Lockwood, Greene & Co., Boston, engineers, have been engaged by the General Radio Co., Cambridge, Mass., to build this spring a three-story, 50 x 80 ft., manufacturing plant.

Equipment is required for a one-story, 30 x 30 ft., pump house to be erected by the Marine Biological Laboratory,

Falmouth, Mass. This project and other improvements will cost $800,000.

Hoisting apparatus will be required for a three-story plant contemplated by the Stonecraft Co., 100 Cunnington Street, Boston, sketches for which are being prepared.

Permit has been granted the American Steel & Wire Co., Worcester, Mass., to erect a one-story, 64 x 840 ft., addition to the South Works electric cable plant, to cost $150,000. Clinton S. Marshall, 94 Grove Street, is district manager. The company's engineers are planning the work.

Miscellaneous equipment is required for an addition being erected by the Elliott Addressing Machine Co., 143 Albany Street, Cambridge, Mass. Foundations are in and subcontracts are being let. Plans are private.

Larry cars, coal crushers and other equipment are required for improvements being made at the Feeble Minded School, Waverly, Mass., bids for which are extended until this week. The work is under the supervision of the Commission of Mental Diseases, Boston. C. H. Tenney & Co., 200 Devonshire Street, Boston, is the engineer.

Appropriations have been made for the erection of a new small electric power plant in South Ashburnham, Mass., by the town of Ashburnham.

Fred T. Ley Co., Inc., Springfield, Mass., has been awarded contract to erect a coal trestle for the Orford Soap Co., Hilliard Street, Manchester, Conn., for which lifting and conveying equipment is required. L. H. Geer, 62 Prospect Street, South Manchester, Conn., is the architect.

New equipment will be required by the Worcester Electric Mfg. Co., Worcester, Mass., due to a fire last week. The Robbins Machine Tool Co. and Hale Brothers Co., chains, occupying quarters in the same plant, suffered considerable damage by water.

Plans have been filed by the National Can Co., 36 Washington Street, North, Boston, for a new factory at 71 Locust Street, estimated to cost $75,000.

The Rubwood Wheel, Inc., Monson, Mass., is having plans drawn for a three-story addition, 60 x 300 ft. A new steam-operated electric power plant will also be erected. The expansion will cost more than $125,000 with equipment.

The Blackstone Valley Gas & Electric Co., Pawtucket, R. I., is arranging for an increase in capital from $8,000,000 to $16,000,000, practically the entire proceeds to be used for extensions in power plants and system.

The Steam Vehicle Corporation of America, Inc., has succeeded to the plant and business of the Stanley Motor Carriage Co., Newton, Mass., manufacturer of steam-propelled automobiles. Plans are under consideration for expansion to include the manufacture of steam taxicabs and buses.

The Lawrence Motor Co., 218 South Broadway, Lawrence, Mass., is having plans drawn for a one-story machine and repair shop addition, 50 x 100 ft. John N. Feugill, 316 Essex Street, is architect. John W. McCarthy heads the company.

The Miller Co., Meriden, Conn., has been chartered under State laws with capital of $2,400,000 to manufacture metal and glass products, forming a consolidation of Edward Miller & Co., with local plant: the Duplexalite Corporation, 68 Park Place, New York, and the Ivanhoe-Regents Works, Cleveland, all manufacturers of electric lighting fixtures. Expansion plans are under consideration for the different units. Rex J. Cole is president and Michael Schwartz, vice-president and general manager.

The Blackstone Hall Co., 114 Westminster Street, Providence, R. I., has filed plans for a new automobile service and repair building at Lyman Street and Cressy Lane, 60 x 100 ft., with extension, 30 x 32 ft. It will cost $80,000.

The Draper Corporation, Hopedale, Mass., manufacturer of textile machinery and parts, has acquired the plant of the Woodstock Lumber Co., Beebe River, N. H., and will remodel the property for a bobbin mill.

The Plume & Atwood Mfg. Co., Waterbury, Conn., manufacturer of brass goods, lamps, etc., is considering the erection of a five-story addition, 50 x 150 ft.

The Jennison Co., Fitchburg, Mass., manufacturer of metal products, plans the installation of a bending roll, squaring shears and other equipment.

Directors of Johns-Manville at a recent meeting elected the following officials: T. F. Manville, chairman of the board; H. E. Manville, president; L. R. Hoff, vice-president and general manager; W. R. Seigle, J. E. Meek, J. W. Perry and J. S. Carroll, vice-presidents; A. C. Hoyt, secretary-treasurer; T. F. Manville, Jr., assistant secretary-treasurer.

The Rosenbaum Mfg. Co., 33 Bleecker Street, New York, manufacturer of electric pressing appliances, will be located at 54-58 East Ninth Street, about May 1.

Chicago

CHICAGO, March 17.

PROSPECTIVE buying by the steel mills is commanding increasing attention in the local market. The Youngstown Sheet & Tube Co. has issued an inquiry for its Indiana Harbor, Ind., plant. Inquiries from the Inland Steel Co. and the Illinois Steel Co. are still pending. Considerable equipment will be bought for the National Tube Co. plant now under construction at Gary, but orders for the machine tools will be placed at Pittsburgh and, according to latest advices, action cannot be expected for two or three months. Aggregate purchases of machine tools and special purpose equipment by the Western Electric Co. during the past month or two have been large, estimated in some quarters as exceeding $200,000. In general, however, orders from industrial buyers have been disappointing. Inquiries have been numerous, but frequently have been mere feelers for estimating purposes, and no orders have developed from them.

Fairbanks, Morse & Co. have closed for miscellaneous equipment for its Beloit, Wis., plant, including two No. 4½ Niagara punch presses, four sensitive bench drilling machines and a bench drill grinder. Among recent purchases by the Western Electric Co. are a number of drilling machines, a large squaring shear and a bending brake. An Iowa buyer has bought a 24-in. shaper, a 20-in. engine lathe and a hack saw, while a local consumer has closed for two large power presses and an 8-ft. power squaring shear. The Santa Fe has added a motor-driven 16-in. x 6-ft. portable lathe to its pending list. The Chicago, Milwaukee & St. Paul has shortened and revised its list published in this column on Feb. 7. The road will buy used equipment wherever possible.

Youngstown Sheet & Tube Co. List

One 30-in. x 24-ft. motor-driven engine lathe.
One 600-ton wheel press.
One 18-in. x 10-ft. single-pulley drive engine lathe.
One 7-in. two-spindle centering machine.
One motor-driven drill grinding machine.

The Harnell-Elcock Co., Chicago, has ordered a No. 7 cupola from the Whiting Corporation, Harvey, Ill.

The Sinko Tool & Mfg. Co., 1632 North Halsted Street, Chicago, has purchased a site, 125 x 175 ft., on Crawford Avenue, 250 ft. north of Lake Street, and will erect a factory.

The Gulbransen-Dickinson Co., manufacturer of piano players, 3232 West Chicago Avenue, Chicago, has awarded contracts for a six-story addition, 100 x 100 x 145 ft., to cost $200,000.

The Crane Co., Forty-first Street and Kedzie Avenue, Chicago, has let a contract for a one-story boiler house, 87 x 104 ft., at 4100 South Kedzie Avenue, to cost $195,000.

The Union Interior Finish Co., 5317 South La Salle Street, Chicago, has let a contract for a one and three-story factory, 30 x 74 ft. and 20 x 43 ft., to cost $20,000.

The Wolff Mfg. Corporation, 2000 Fulton Street, Chicago, has let contracts for a one-story plant at that address, 123 x 156 ft., to cost $46,000.

The Wagner Castings Co., Decatur, Ill., contemplates the construction of a building, 53 x 100 ft., to cost $12,000.

The Harrington-Seaberg Fire Alarm Telegraph Co., a newly organized company at Moline, Ill., has awarded contract for a two-story plant, 70 x 120 ft., at Third Avenue and Twentieth Street, to cost $25,000. The manufacture of fire alarm systems is now being carried on in temporary quarters at Third Avenue and Seventeenth Street. Officers are: President, Severin Seaberg; vice-president, Axel Carlson, and F. H. Harrington, secretary. The company also manufactures magnetic sign flashers and police call systems.

The American Sanitary Mfg. Co., Abingdon, Ill., will increase its capital stock from $240,000 to $320,000 to finance the construction of a new plant at Abingdon to take the place of the manufacturing facilities of a company recently purchased at Waukegan. The south end of the present factory at Abingdon will be torn out and an addition, 92 x 94 ft., will be built. The roof will be removed from the present one-story factory building and the entire structure will be covered with a saw-tooth roof. The construction work alone will cost $50,000.

The Sanitary Scale Co., 565 West Washington Boulevard, Chicago, has awarded contract for a plant, 60 x 200 ft., at Belvidere, Ill.

The Chicago, Burlington & Quincy Railroad contemplates the erection of a large steel car repair plant at Galesburg, Ill.

The Radio Instruments Co. of Chicago, 17 North Wabash

Avenue, Chicago, recently incorporated, has been in business for over two years as a partnership. The company manufactures Church automatic templates. It employs several metal working machines of a minor character and expects to increase its manufacturing facilities, although a new location for its plant has not yet been decided. Officers are W. F. Kuster, president; S. L. Bierfeld and George Sugarman.

The Parker Shock Absorber Co., 2432 South Wabash Avenue, Chicago, recently incorporated with $35,000 capital stock, has leased a plant at the address given and is manufacturing a new type of shock absorber. Officers are F. P. Hawkins, president; Charles N. Stevens, vice-president, and Waite H. Squier, secretary-treasurer.

Amberlite Products, Inc., recently organized with $25,000 capital stock to succeed the Wilson-Collen Mfg. Co., 716 West Madison Street, Chicago, contemplates building or leasing a factory for the manufacture of "amberlite" shade electric lamps. It will be in the market for machinery appertaining to the manufacture of lamps. Officers are: Arthur Wilson, president and treasurer, and John W. Oats, secretary.

The Unit Sashweight Co., 10 North Clark Street, Chicago, recently incorporated with $350,000 capital stock, will manufacture window weights in 1-lb. units, so that any size can be made by stringing them together. A plant has been leased at 4600 Iowa Street, Chicago, and plans are under way for leasing factories in twelve other cities. For the manufacture of the weights a machine has been devised, having a rated capacity of 1,000,000 lb. per sq. in. pressure. Eight of these will be installed in the Chicago plant, and each is expected to turn out 5 tons every 8 hr. Officers are: President and general manager, C. W. Tarbet; secretary and treasurer, E. C. Smeltzer.

The Ford Motor Co., Cummings and Sixteenth Streets, Omaha, Neb., contemplates enlargements in its assembling plant and the installation of additional equipment estimated to cost $80,000.

The City Council, Faribault, Minn., is considering the construction of a municipal electric light and power plant. It is expected to select an engineer to prepare plans at an early date.

The American Cement Plaster Co., Fort Dodge, Iowa, has awarded a general contract to W. J. Zitterell, Webster City, Iowa, for the erection of a new branch mill at Webster City estimated to cost $65,000.

The Board of Golden Valley County Commissioners, Ryegate, Mont., plans the installation of electric-operated pumping machinery in connection with its proposed Franklin irrigation project. Work will commence in the spring. W. O. Wood is County clerk.

The Common Council, Marshalltown, Iowa, plans the installation of electric-operated pumping machinery in connection with extensions in the municipal waterworks estimated to cost $300,000. O. G. Herm is city engineer in charge.

The Wabash Railroad Co., St. Louis, has authorized plans for rebuilding the portion of its locomotive and car repair shops at Decatur, Ill., recently destroyed by fire. Additional equipment will be installed. The work is estimated to cost $200,000. J. E. Danes, Decatur, is division engineer.

The Omaha Pipe Co., 1417 Davenport Street, Omaha, Neb., is planning to rebuild the portion of its works recently destroyed by fire with loss approximating $50,000, including equipment.

The Electrical Engineers Equipment Co., 710 West Madison Street, Chicago, is having plans drawn for a one-story factory on a 16-acre tract recently acquired in the Melrose Park section, estimated to cost $125,000 with equipment. The Woodmansee & Davidson Engineering Co., 208 South La Salle Street, are architects and engineers.

Detroit

DETROIT, March 17.

PRELIMINARY plans are being considered by the Hayes Wheel Co., South Horton Street, Jackson, Mich., for an addition to its branch plant on North Clinton Street, Albion, Mich.

A merger has been arranged between the Escanaba Power & Traction Co., and the Escanaba Paper Co., both of Escanaba, Mich. The consolidated company is considering plans for the installation of additional hydroelectric power equipment at its plant at Groos, Mich., estimated to cost $100,000.

The Ford Motor Co., Detroit, is perfecting arrangements for the construction of a new assembling plant in the vicinity of Puerto, Mexico, to cost $400,000 with machinery. It is expected to employ local labor and close to 100 Mexicans are now being instructed in one of the Ford plants in the South for the work.

The Detroit Edison Co., 2000 Second Street, Detroit, will issue stock for $6,800,000, a portion of the proceeds to be used for extensions and the installation of additional machinery. The company is arranging for an increase in capital from $60,000,000 to $85,000,000 for expansion.

The American Spring & Mfg. Co., Holly, Mich., manufacturer of automobile springs, has acquired the former plant of the L. A. Young Industries, previously devoted to the production of wagons. The new owner plans to remodel the structure for the manufacture of its regular line of steel springs.

The Syncro Motors Co., 54 Barney Street, Battle Creek, Mich., has tentative plans for additional units, one and two stories, for the manufacture of automobile engines, etc. F. J. Clark is president and general manager.

The Lee Machinery Co., 3171 Bellevue Avenue, Detroit, has inquiries out for a bolt-threading machine, milling machine, grinder, lathes and other tools.

Manual training equipment will be installed in the junior high school to be erected at Port Huron, Mich., estimated to cost $225,000, for which bids have been asked on a general contract. G. L. Harvey, 201 Huron Street, is architect.

The Cadillac Motor Car Co., 2060 Clark Street, Detroit, is taking bids for two additional buildings, each one-story, with cost reported at $250,000 including equipment. The Austin Co., First National Bank Building, is engineer.

Cleveland

CLEVELAND, March 17.

MACHINE tool manufacturers and dealers continue to book a moderate volume of scattering orders for one or two machines, the demand having changed very little the past few weeks. No new inquiries are pending. Good used machinery is moving fairly well. Not much business is coming at present from Detroit automobile companies, although there is still some demand from that source for special production machinery. No extensive buying is looked for from the automobile industry in the next few months. One line that shows more life is punching and shearing machinery for which some demand has sprung up from fabricating shops in the building field. The Cincinnati-Indianapolis & Western Railroad has an inquiry out for a motor-driven hydraulic wheel press.

Crane builders report a fair volume of inquiry but prospective purchasers are slow in placing orders. Several good inquiries are pending for coal and ore handling equipment.

The Elyria Iron & Steel Co., Cleveland, will add 50 per cent to the capacity of its Elyria, Ohio, cold-rolled steel department when extensions recently announced are completed. New structural work will include a pickling building and extensions to the cold rolling and annealing departments. Additional equipment for the three departments will be required and has not yet been purchased.

The Willard Storage Battery Co., East 131st Street, Cleveland, is taking bids for an additional story, 80 x 135 ft., to one of its factory buildings.

The Standard Sanitary Mfg. Co. is preparing plans for a pottery factory in connection with its Tiffin, Ohio, plant. Equipment required will include power operated ventilators and conveyors. G. W. Netcher, 11½ South Washington Street, Tiffin, is the architect.

The W. S. Tyler Co., Cleveland, manufacturer of ornamental iron and bronze, has placed contract for a one-story factory, 32 x 56 ft.

The city of St. Marys, Ohio, is preparing plans for enlarging and remodeling its municipal light and water plant. Deep well and centrifugal pumps will be required.

The Bertolini Brothers, marble and tile contractors, 26 Walnut Street, Youngstown, Ohio, have taken bids for a two-story and basement factory addition, 50 x 130 ft. Richard A. Zenk, 144 West Woods Street, Youngstown, is the architect.

The city of Conneaut, Ohio, is having preliminary plans prepared for a $100,000 filtration plant. Burgess & Nipple, 223 East Broad Street, Columbus, Ohio, are the consulting engineers.

The Virden Co., 1605 Longfellow Avenue, Cleveland, manufacturer of brass products, will build a two-story brick factory addition, 20 x 86 ft.

The Ward Railway Equipment Co., Kensington Apart-

ments, Lima, Ohio, has been organized to manufacture railroad appliances and attachments. Arrangements have been made with railroads to handle foundry work, locomotive cylinders, grate bars, etc. It is planning to erect a foundry, 100 x 400 ft. No contracts have been placed. Initial capital stock was $50,000, but this is to be increased at once. Among its first products will be a re-railer and an air release appliance. George L. Shambow is vice-president.

A power house will be constructed by the H. J. Heinz Co., 1062 Progress Street, Northside, Pittsburgh, at its proposed plant on 18 acres acquired at Oak Street, Whitmore Road and Tracey Avenue, Toledo, Ohio, estimated to cost $750,000 with equipment.

The water department, Sandusky, Ohio, contemplates the purchase of electric pumps, substituting present steam-driven pumps at the city waterworks.

Electrical and other mechanical equipment will be required for the new garbage disposal plant to be built at a cost of $150,000 at Lakewood, Ohio, for which E. A. Fisher, city engineer, is in charge.

Manual training and vocational departments will be installed in new school to be erected at Lakemoore, Ohio, by the Summit County Board of Education, Akron, for which bids are being received on a general contract until March 28. Harpster & Bliss, 234 Central Savings Bank & Trust Building, Akron, are architects.

The Buerger Iron Works, Firestone Park, Akron, Ohio, will shortly be in the market for shop equipment.

Pittsburgh

PITTSBURGH, March 17.

SENTIMENT is more cheerful in the machine tool trade and the past week has seen a quickening in inquiry and sales. The Westinghouse Electric & Mfg. Co. has been buying against its list, but it is in prospective business that the trade derives its principal encouragement. Pending are tools for the National Tube Co., for its Gary works, and the American Sheet & Tin Plate Co., for several plants where improvements are in progress. A new list by the Westinghouse Electric & Mfg. Co. is expected shortly.

Rolling mill equipment has been in better demand. The American Sheet & Tin Plate Co. has closed for the four new mills for its Mercer works, Farrell, Pa., with the Mesta Machine Co. These are 30-in. mills, and the company expects to have them in operation by early fall. Letting of the new 14-in. continuous mill of the Jones & Laughlin Steel Corporation at Woodlawn, Pa., is believed to be near. The Fairbanks-Morse Co., Beloit, Wis., recently ordered a 1000-ton press from the United Engineering & Foundry Co., and a manipulator from the Alliance Machine Co. The Bethlehem Steel Co. recently placed orders for gears and mill drives in connection with improvements at Bethlehem and Sparrows Point with the Mesta Machine Co. The Carnegie Steel Co. is modernizing the blooming mill at its Clairton works and the new equipment will be furnished by Mesta Machine Co.

The Erie Steam Shovel Co., Erie, Pa., is completing plans for a one-story addition, 200 x 300 ft., to cost approximately $100,000 including equipment. The Osborn Engineering Co., 7016 Euclid Avenue, Cleveland, is architect and engineers.

The Baltimore & Ohio Railroad Co., Baltimore, is planning the construction of a water-treating plant at Connellsville, Pa., near its local shops. The installation will include three electric-operated pumping units with capacity of 500 gal. per min., and auxiliary machinery. It will cost close to $100,000.

The A. C. Love Co., Huntington, W. Va., machinery dealer, has inquiries out for a 3-drum hoisting engine, with swinger, boiler and auxiliary equipment.

The plant and property of the West Virginia Metal Products Co., Fairmont, W. Va., has been acquired at public sale for $500,000 by Charles F. Patterson, Frick Annex, Pittsburgh, attorney, acting for the bondholders' committee. The plant represents an investment of about $1,500,000. With the transfer of the property, the purchasers are said to have tentative plans for a reorganization of the company and operation of the plant for the manufacture of a line of brass goods.

Roley Brothers, Belle Vernon, Pa., have plans for the construction of a two-story automobile service and repair building, 60 x 110 ft., estimated to cost $60,000 including equipment. H. Ernest Clark, 472 Donner Avenue, Monessen, Pa., is architect.

The Tourist Garage Co., Charleston, W. Va., has awarded a general contract for a one and two-story service and repair building, 85 x 245 ft., estimated to cost $65,000 with equipment. H. B. Agslen & Son, Charleston National Bank Building, is contractor; Knapp & Haviland, Capitol City Bank Building, architects. F. W. Johnston is head.

The United States Chain & Forge Co., Pittsburgh, will shortly begin the erection of an addition to its York, Pa., plant.

Cincinnati

CINCINNATI, March 17.

ORDERS for machine tools are increasing, although buying is not by any means heavy. There is, however, more demand for single machines, and as a result a better feeling is noticeable regarding the immediate future at least. No large orders are reported, but automobile companies continue, perhaps, the leading factor in the market. Railroad buying is expected to get under way this week with purchases by the Sante Fe and Southern Railway. The American Locomotive Co. is about to close on a number of tools recently inquired for. The Ford Motor Co. is also expected to close for several machines.

Dealers report business fair with prospects for a better volume during the next few weeks. Inquiry continues good, and a lessening of sales resistance on the part of buyers is noted.

The Louisville Gas & Electric Co., Louisville, Ky., has acquired the properties of the Madison, Ind., Light & Power Co., and has plans for the construction of transmission lines 40 miles along the Ohio River.

The Columbus Railway, Light & Power Co., Columbus, Ohio, contemplates the erection of a power generating plant in Harrison Township, Pickaway County. Plans are under way and it is expected that contracts will be let for construction during the summer.

The National Broach Co., Dayton, Ohio, has been incorporated with capital of $50,000. Oscar M. Pocock, president of the City Machine & Tool Co., is president of the new company, which will occupy part of the plant of the City Machine & Tool Co.'s factory on June Street. Considerable new machinery will be installed.

The Miami Scraper Co., Troy, Ohio, has been incorporated with a capitalization of $100,000 to manufacture scrapers to be attached to tractors. The plant will be established in Troy, but it has not been decided whether the company will erect a new building or lease one. E. W. Jewell is the principal incorporator.

The H. W. Weeks Co., Hamilton, Ohio, manufacturer of electric ranges and sterilizers, has purchased the plant of the Hamilton Mattress Co. and will move to the new site. It contemplates considerable additions to equipment to increase its output.

The Liberty Machine Tool Co., Hamilton, manufacturer of planers, has begun the erection of an addition to its main bay to give more room for assembling purposes. Later the side bays will be extended and new equipment installed. A. R. McCann is vice-president and general manager.

The Globe Folding Box Co., Cincinnati, has awarded contract for an addition to its plant at Mitchell Avenue and the Baltimore & Ohio Railroad. It will be of reinforced concrete, one-story, 80 x 120 ft. Woodworking machinery will be installed.

The Wright Machine Co., Owensboro, Ky., is in the market for a steam hammer for welding oil field stems up to 5½ in. in diameter.

The Cambridge Body Mfg. Co., Wheeling Street, Cambridge, Ohio, manufacturer of automobile bodies, is considering the erection of a new one or two-story plant, 60 x 150 ft., to cost about $40,000, including equipment.

The Nashville Pulp & Paper Co., Nashville, Tenn., is said to have plans nearing completion for the erection of a new paper mill, to cost about $750,000 with machinery. The project will include a power house and machine shop.

The Monarch Automobile Co., 142 East Broadway, Louisville, has plans for a two-story addition to its service and repair building, 45 x 150 ft., estimated to cost $55,000. Nevin, Wischmeyer & Morgan, Starks Building, are architects. C. S. Potter heads the company.

The Newport Body Mfg. Co., Newport, Ky., has awarded a contract to Samuel Crawford, Newport, for the erection of a new plant at 1026 Saratoga Street, for the manufacture of automobile bodies.

The City Council, Delphos, Ohio, is planning to purchase two new boilers for the waterworks plant.

The Hudson Harrow Co. has been incorporated at Humboldt, Tenn., by J. G. Warmath, president; G. D. Dodson, vice-president; J. P. Sharp, secretary-manager, and J. R. Thweat, treasurer. It has acquired a plant and installed machinery for the manufacture of a side harrow attachment for cultivators.

Indiana

INDIANAPOLIS, March 17.

THE Northern Indiana Gas & Electric Co., Hammond, Ind., is arranging an appropriation of $778,000 for extensions in its local power plant and system during the year, including the installation of new equipment. Other funds for expansion and betterments are Michigan City, $291,000; South Bend, $220,000, and Lafayette, $130,000.

The Board of Trustees, City Hospital, Indianapolis, has plans for extensions in the power house at the institution, in connection with other expansion to cost approximately $250,000. The power station work will include two new boilers, water-softening equipment and auxiliary apparatus.

The Central Indiana Power Co., Indianapolis, is disposing of a note issue of $6,500,000, a portion of the proceeds to be used for extensions and the installation of additional equipment. The company has work nearing completion on a new generating plant on the Wabash River. Additional units will be installed at this location later. Joseph H. Brewer is president.

The Automotive Parts Co., Chicago, has acquired production rights from the Mid-West Engine Co., Indianapolis, for the manufacture of small tractors, operated by a one cylinder motor, known as Utilitors. Extensive production and assembling are planned by the Automotive company, to be carried out, it is understood, at the Chicago works.

C. Off & Co., Indianapolis, have started the erection of a new one-story plant at 105 North East Street, for the manufacture of a line of sheet metal products.

Charles E. Keel, Indianapolis, has arranged for the establishment of a one-story machine shop at 108 East Morris Street.

St. Louis

ST. LOUIS, March 17.

BIDS will be asked at an early date by the City Council, Newton, Kan., for a one-story municipal steam-operated electric power plant to cost $50,000. A five-ton traveling crane will be installed. E. T. Archer & Co., New England Bank Building, Kansas City, Mo., are architects and engineers.

Motors, controls, conveying and other equipment will be installed in the three-story and basement printing plant, 120 x 140 ft., to be erected by the Concordia Publishing House, 3558 South Jefferson Avenue, St. Louis, to cost $250,000. H. H. Morrison, Fullerton Building, is steam and electric engineer.

B. Levitch, Kansas City, Mo., has awarded a general contract to G. O. Klement, Kansas City, for a one-story plant at 2211 Campbell Street, totaling about 12,000 sq. ft., for the manufacture of automobile bodies, with repair department, to cost $27,000.

The Pittsburgh Plate Glass Co., Crystal City, Mo., plans the installation of additional equipment at its local mill, primarily for electric power service, including motors, controls, etc. It has closed a contract with the Union Electric Light & Power Co. for service which is perfecting plans for the extension of its transmission line and the installation of an automatic power substation.

The Perfection Mfg. Co., 2701 North Leffingwell Avenue, St. Louis, manufacturer of metal specialties, is planning the installation of a gang punch press for light stamping work, and other equipment.

The Cities Service Co., 60 Wall Street, New York, has acquired the Consumers' Light, Heat & Power Co., Topeka, Kan., and the Union Public Service Co., Beggs, Okla., and vicinity. The new owner plans extensions and the installation of additional equipment. The first noted utility will operate under the name of the Capital Gas & Electric Co.

Manual training equipment will be installed in the three-story high school to be erected at Guthrie, Okla., estimated to cost $190,000, for which plans are being prepared by Hawk & Parr, Oklahoma City, Okla., architects, who will soon ask bids on a general contract.

The Oklahoma Power Co., Henryetta, Okla., is planning for extensions in its power plant, and the installation of additional machinery estimated to cost $25,000. It is also perfecting plans for a steam-operated electric generating station at Weleetka, Okla., with installation to include a 10,000 hp. turbo-generator and auxiliary machinery, estimated to cost $800,000 with transmission system. C. H. Kretz, Okmulgee, Okla., is engineer.

The Board of Trustees, Interstate Vocational University, Lawton, Okla., is having plans drawn for a two-story addition, 50 x 140 ft., estimated to cost $65,000. G. S. Glenn, Lawton, is architect.

The Auto Wheel & Body Works, Tulsa, Okla., have awarded a general contract to G. D. Morrow & Co., Tulsa, for the erection of a one-story plant, 50 x 142 ft., for the manufacture of automobile bodies, wheels, etc., with repair department for such equipment. Work will begin at once.

Milwaukee

MILWAUKEE, March 17.

SCATTERING sales, principally of single machines, continue to lend what little feature there is to the machine-tool trade. At the same time considerable activity in inquiry exists, yet no large-lot business is involved. Competition from used tools remains a check on new-tool business. The industrial situation with special reference to foundries and machine shops is making slow but steady improvement, providing substantial hopes for at least a continuance of moderate activity. Shops dealing wholly or in large part with the automotive industries are working at capacity.

The Glancy Malleable Corporation, Waukesha, Wis., operating under lease the Waukesha malleable iron foundry, formerly leased by the Samson Tractor Co., Janesville, Wis., which has been liquidated by the General Motors Corporation, has taken a lease of the foundry department of the Samson tractor plant at Janesville, Wis. This is a gray iron shop, which is now being converted into a malleable casting shop by the installation of a 20-ton air furnace and the construction of a new 50-ft. stack. The changes are to be completed by May 1. L. A. Williams is general superintendent at Waukesha, and his assistant, L. H. Pollock, has been appointed to a similiar position at Janesville. A. R. Glancy is president and general manager.

The Milwaukee Structural Steel Co., 1825 St. Paul Avenue, Milwaukee, which is completing a new fabricating shop, 125 x 310 ft., has increased its capitalization from $100,000 to $200,000 to finance the expansion, for the purchase of some additional equipment and for working capital. John F. Henry is secretary and treasurer.

The Fox Brothers Co., 129 North Third Street, LaCrosse, Wis., awarded the general contract to Charles W. Noble, local engineer, for erecting a two-story automotive sales and service building, 50 x 150 ft., estimated to cost $45,000. It is to be ready about June 1.

The Special Machinery & Mfg. Co., 1919 St. Paul Avenue, Milwaukee, is buying a number of additional tools for handling a $40,000 contract for furnishing the Wisconsin State Highway Commission the current year's supply of metal highway markers, number plates, etc.

The Garton Toy Co., North Water Street and Niagara Avenue, Sheboygan, Wis., will build a $50,000 manufacturing addition, of brick and mill construction, with a springler system, and has let the general contract to the Van Doeselaar Co., Inc., 1712 North Second Street. Metal and wooden toys and novelties are manufactured. The architect is E. A. Stubenrauch, Sheboygan.

The Mattson Foundry Co., Chippewa Falls, Wis., has been organized by Albert Mattson to take over the lease and operate a gray iron foundry at West Columbia and Wagner Streets, on the "Soo Line" tracks, which has been idle for some time. The major part of the production will be absorbed by the Westco-Chippewa Pump Co., formerly the Chippewa Pump Co.

The Central Foundry Corporation, West Allis, Wis., has been incorporated with a capital stock of $25,000 preferred and 500 shares of common without par value. It is planned to establish a gray iron casting shop in an existing building, the location of which is withheld. William E. Krause, Lisbon Road and Lake Avenue, town of Wauwatosa, will be the principal owner and manager. With him appear as incorporators Herman Dein and Leo J. Landry, attorney, 425 East Water Street, Milwaukee.

The Board of Education, Kimberly, Wis., is asking bids until March 27 for the construction of the first unit of a new combination high, vocational and graded school, 75 x 152 ft., two stories and basement, costing $125,000. Three units are embraced by the plans of Oppenhamer & Obel, architects, Wausau and Green Bay, Wis. M. H. Kettenhofen is chairman of the board.

South Atlantic States

BALTIMORE, March 17.

PROPERTY at Hagerstown, Md., has been acquired by the Tidewater Steel Co., Baltimore, recently organized with M. D. Perine as president, as a site for the construction of a new mill, using steel scrap for raw material, estimated to cost $200,000 with equipment. Facilities will be provided for the employment of about 200. The works will include a power house.

The general purchasing officer, Panama Canal, Washington, will receive bids until April 3 for a quantity of mechanical equipment, including steel wire and rope; hacksaw blades; steel tapes; steel pinions; drills; files; screws; nails, etc., circular 1596; until March 29, for 17 bandsaws; 94 drill rods; 500 pairs of welding goggles; 500 ft. iron or steel chain; 500 lb. copper nails, and kindred products, circular 1595.

The North Carolina Public Service Co., Greensboro, N. C., recently organized to succeed to the plants and properties of the company of the same name, is disposing of a bond issue of $880,000, a portion of the proceeds to be used for extensions and additional equipment. W. S. Barstow is president.

The Eagle Engineering Co., New Bern, N. C., is in the market for a steam shovel on traction wheels or crawler, ¾-yd. capacity.

Bids will be received by J. H. Clemmitt, purchasing agent, Norfolk & Western Railway Co., Norfolk, Va., until March 26 for requirements for wire fencing from April 1 to June 30, Contract Serial No. AA-294; also for requirements of couplers and parts, for the same period. Contract Serial No. AA-295; for steel springs, Contract Serial AA-292; and for 30 cast steel truck bolsters, Contract Serial AA-296.

The Wilson-Hock Co., City Point, Va., machinery dealer, has inquiries out for a filter press, about 850 sq. ft., cylinder type, Kelly or similar; also for a radial drill, with swing from 26 to 48 in.; motors, 75 and 200 hp., three-phase, 60-cycle, 440 volts; one steel tower tank unit, 20,000 gal. capacity; and one log-loading and skidding machine, standard gage track, to handle about 4 flat cars.

The Rucker Bonded Warehouse Co., Greensboro, N. C., has plans for a new cold storage plant to cost approximately $90,000 including machinery. J. M. Workman is company engineer.

The Hampton Roads Coal & Bunkering Corporation, Norfolk, Va., will begin the construction of a coal bunkering station on the inner harbor waterfront, for which site has recently been acquired, estimated to cost $120,000 with loading, conveying and other coal-handling equipment. Col. M. A. Butler, Norfolk, is engineer.

The Curtis Bay Copper & Iron Works, Curtis Bay, Baltimore, is making extensions in its plant, to include the installation of a drop forge and hammer department, primarily for the manufacture of high-pressure drop forge valves and allied specialties.

The City Council, Chatham, Va., will receive bids until March 31 for equipment for a pumping plant and filtration works for the municipal water station, including electric-operated low service centrifugal pump, direct-connected; high service centrifugal pump, belt drive; semi-Diesel fuel oil engine, with air starter outfit; 10,000 gal. capacity steel oil tank, with about 500 ft. gravity feed, all as per plans and specifications on file at the office of the Ambler Engineering Co., Richmond, Va., engineer. William M. Tredway is city clerk.

The Bacon Hosiery Mills, Hendersonville, N. C., has inquiries out for oil burners and oil-burning equipment for installation in their power house.

The American Film Safe Corporation, Columbia Avenue, Baltimore, is planning the erection of an addition to cost $100,000 including equipment.

The Unaka Mining Co., Asheville, N. C., is in the market for equipment for hydraulic mining operations, including air drills, air compressors, washing machines, tram cars, loading machinery, etc.

W. P. Beall, P. O. Box 122, Macon, Ga., has plans under way for the establishment of a factory to manufacture bobbins and kindred specialties. It is proposed to organize a company. Machinery will be purchased at an early date.

The Flint River Power Co., a subsidiary of the Central Georgia Power Co., Macon, Ga., is perfecting plans for a hydroelectric generating station in the vicinity of Thomaston, Ga., where a site has been acquired. It will cost more than $400,000. The parent company is planning for extensions in its central power house at Macon, including the installation of additional machinery.

In connection with its proposed oil storage and distributing plant in the Shipyard Creek district, Charleston, S. C., the Gulf Refining Co., Frick Annex, Pittsburgh, has plans for a car repair shop, machine shop, power house, pumping plant, barrel shop, cooper shop and automobile service building, for which a list of machinery will soon be arranged. The plant will cost approximately $800,000 with equipment.

The Delaware Auto Radiator Repairing Co., Wilmington, Del., has awarded contract to S. Cantera & Son, Wilmington, for a one-story metal working plant at 1301-3 French Street, on which construction will begin at once.

The Hackley-Morrison Co., 1708 Lewis Street, Richmond, Va., machinery dealer, is in the market for a clam shell bucket, for a cableway, one double drum hoisting engine; and two watertube boilers, 350 hp. each, Babcock & Wilcox type, with auxiliary apparatus.

Pacific Coast

SAN FRANCISCO, March 12.

A TRACT of six acres on Seventy-ninth Avenue, Oakland, Cal., adjoining the works of the Victor Talking Machine Co., has been purchased by the Illinois Wire & Cable Co., Sycamore, Ill., as a site for a new plant for Pacific Coast trade. It is expected to begin work on the initial unit, one-story, to be ready for service in June. The estimated cost is $100,000 with equipment.

The Woolbestos Products Co., Torrance, Cal., has begun the erection of a new plant at Arlington Avenue and 208th Street, for the manufacture of steel wool, utilizing the waste material from the works of the Columbia Steel Co. The initial unit is estimated to cost $30,000. John B. Lomasney is president.

The California Packing Co., 101 California Street, San Francisco, plans the construction of a power house, ice and cold storage plant at its new fruit packing plant at Sacramento, Cal., estimated to cost $1,000,000 with equipment. A conveyor system will also be installed. Philip L. Bush, company address, is engineer. It is also planning for a new packing house in the vicinity of Ignacio, near San Rafael, Cal., to include an ice and cold storage plant, estimated to cost $55,000.

The American Railway Car Co., 613 Henry Building, Portland, has engaged Edward A. Miller, Henry Building, architect, to prepare plans for the first unit of its works for the manufacture of railroad car equipment, one-story, 60 x 300 ft., estimated to cost $90,000 with machinery. A. D. Brown is president.

Daniel O'Neill, 273 Mission Street, San Francisco, is having plans drawn for a two-story and basement machine shop, to cost $17,000 exclusive of machinery. J. E. Krafft & Sons, Phelan Building, are architects.

The Chicago Pneumatic Tool Co., Los Angeles, is having plans prepared for a one-story factory, 50 x 140 ft., at Jesse Street and Santa Fe Avenue, to cost approximately $75,000 with equipment. Monaco & Bordeaux, International Bank Building, are architects. Headquarters of the company are at 6 East Forty-fourth Street, New York.

The Coeur d'Alene Mill Co., Weippe, Idaho, is planning the construction of a new sawmill and power house to cost approximately $70,000 including equipment. Fred Herrick is general manager.

The Goose Air Springs Co., Inc., San Francisco, manufacturer of automotive equipment, has leased a one-story building to be erected by the San Francisco Realty Syndicate, totaling about 175,000 sq. ft. of floor area, estimated to cost $35,000. A list of equipment will soon be arranged. A. J. Horstmann, 110 Sutter Street, is architect.

The California Garage Syndicate, San Francisco, is having plans drawn for a ten-story and double basement automobile service, repair and garage building, 155 x 300 ft., to cost $2,500,000 with equipment. Joseph L. Stewart, Claus Spreckels Building, is architect. F. P. Mozingo heads the company.

The Fallbrook Irrigation Co., Fallbrook, Cal., is planning the installation of a series of electric-operated pumping plants in connection with its irrigation project, estimated to cost $750,000.

A power house will be constructed by the Towle Log Cabin Products Co., St. Paul, Minn., manufacturer of maple syrup products, at its proposed plant at Seattle, estimated to cost $300,000 with equipment. A machine shop will also be built.

H. S. Freeman, Freewater, Ore., and associates, contemplate the construction of a hydroelectric generating plant on the Walla Walla River, with initial capacity of 1275 hp., estimated to cost $140,000.

Canada

TORONTO, March 17.

SO far this month the demand for machine tools has been better than for any corresponding period since the beginning of the year. Business is scattered over a wide territory and takes in practically every line of industry, but in most cases is confined to small lot buying.

The Canadian National Railways are preparing a good sized list of machine tools and general equipment for shops in both eastern and western Canada which is thought will be issued within the next few days. The Canadian Pacific Railway is also expected to enter the market for tools for car shop replacement purposes and for installation in new plants. The automotive industry is one of the chief buyers at present and a number of small lists have recently been sent out from various plants in Ontario. It is likely that both the Ford Co. of Canada and the General Motors Corporation will shortly enter the market for tools for plants at Ford and Oshawa, Ont.

The Canadian Wirebound Box Co., Ltd., 1000 Gerrard Street East, Toronto, is in the market for a Wheelock or Corliss steam engine, 16 x 36 or 17 x 38; generators, 100, 175 or 200 kw., 60 cycle, 550 volts; also generator, 20 or 25 kw., 25 cycle, 550 volts, all belt driven.

The National Show Case Co., Ltd., Toronto, proposes to start building operations immediately to give additional floor space at its plant of 10,000 sq. ft.

The Niagara Wire Weaving Co., Niagara Falls, Ont., is building addition to its plant and is in the market for equipment, including milling machine, either planer or universal type, etc. E. J. Buell is manager.

The Roamer Motor Car Co., Toronto, recently formed, has taken over the Gary Motor Truck Corporation, Toronto, and will carry on the manufacture of motor trucks, cars, etc. Frank E. Brown, 10 Adelaide Street East, Toronto, is interested.

The A. Malcolm Furniture Co., Kincardine, Ont., will start work early in the spring on an addition to its factory and will require new machinery and tools.

The James B. Watson Co., Kincardine, Ont., will build a $20,000 addition to its furniture factory.

The Knowles Truck Co., Toronto, will start work immediately on alterations to a manufacturing building and the installation of equipment at Midland, Ont., to cost $25,000.

I. H. White, town clerk, Port Colborne, Ont., is receiving bids until March 31 on the following in connection with a waterworks plant: Waterworks building, 55 x 60 ft.; two 750 Imperial gal., motor-driven service pumps; one 1500 Imperial gal., gasoline driven fire pump with piping complete; three 8 x 20 pressure filter units with mixing and wash water tanks. E. H. Darling, 47 Home Bank Building, Hamilton, Ont., is consulting engineer.

Clovis Naud, Deschambault, Que., contemplates the installation of a small turbine in a power plant this spring.

Western Canada

Bids are being received by J. Johnson, utilities superintendent, Prince Albert, Sask., no closing date set, for one 1500 kw., turbine-driven generator for the city light and power plant. Plans and specifications are with the superintendent.

Gulf States

BIRMINGHAM, March 17.

TENTATIVE plans are being considered by the Board of Works, Dallas, Tex., for the installation of an electric power plant at the new city reservoir. It will be of hydroelectric type, with capacity of about 2500 hp. The entire project will involve close to $5,000,000.

The Florida-West Indies Corporation, Tampa, Fla., W. F. Miller, president, recently organized, is planning the erection of a new furniture manufacturing plant to include a one-story power house.

The Standard Rubber Co., New Orleans, La., is arranging for a one-story plant to manufacture automobile tires and tubes, to cost $90,000 including machinery. J. H. Cooper is president.

The City Council, Sarasota, Fla., will take bids for equipment for the municipal waterworks, until March 24, to include a 600 to 750 hp. Diesel engine, oil-operated; one alternator and exciter, 400 to 500 kw.; switchboard, pumping equipment, etc., as per plans and specifications on file. E. J. Bacon is mayor.

Fire, March 8, destroyed a portion of the storage and distributing plant of the Humble Oil & Refining Co., Groesbeck, Tex., with loss estimated at $75,000 including equipment. It is planned to rebuild. Headquarters of the company are at Houston, Tex.

The McCorkle Pipe Line Co., R. A. Stuart, Fort Worth, Tex., head, recently organized, plans the construction of a series of electric-operated pumping plants in connection with its pipe line from the Duncan, Okla., oilfields to points in Texas, about 1700 miles, to cost $1,000,000 with equipment.

The Porth Arthur Ice & Refrigerating Co., Porth Arthur, Tex., is arranging for the erection of a one-story ice-manufacturing plant, estimated to cost $50,000, with equipment. The York Engineering Co., Texas Avenue, Houston, is engineer.

R. E. Boggs, Age-Herald Building, Birmingham, Ala., machinery dealer, has inquiries out for 20 or more two-way dump cars, standard gage, varying from 12, 16 to 20 yds. capacity each.

The Bartram Hoe Works, Inc., Laurel, Miss., recently incorporated, will succeed to an established plant at 304 Front Street, and will specialize in the manufacture of steel hoes, using discarded bandsaws for basis material. It is expected to install additional equipment later, including dies, grinders, cutters, etc. John Anderson is president, and D. W. Bartram, general manager.

The Fishburn Cleaning Co., 3208 Ross Street, Dallas, Tex., has filed plans for a one-story steam power house, to cost $22,000.

Electric-operated pumping equipment will be installed at the proposed waterworks station at Frisco, Tex., estimated to cost $40,000. Work will begin soon.

The Loreauville Sugar Co., Inc., Loreauville, La., is in the market for a 60 kw. generator, three-phase, 60 cycles, with exciter, switchboard and auxiliary equipment; also for a number of motors, from 5 to 40 hp. capacity.

The Grubb Mfg. Co., Pascagoula, Miss., recently organized, has plans for a two-story mill for the manufacture of wood novelties. The equipment will consist of automatic lathes, sanders, rip saws, bench tools and other woodworking machinery. C. W. Grubb is president, and W. F. Martin, secretary and treasurer.

The Reed Automobile Co., Robstown, Tex., will begin the erection of a one-story automobile service and repair building, 50 x 150 ft., with extension, 40 x 40 ft. Bryan Nichols is general manager.

Rogers-Brown Iron Co. Election

At the annual meeting of the Rogers-Brown Iron Co., Buffalo, held March 12, the following officers were elected: William A. Rogers, chairman; William S. Rogers, president; J. Carson Agnew, vice-president; C. R. Holzworth, vice-president; Charles H. Byron, secretary; Harold T. Clement, treasurer; Edward Cornelius, assistant secretary and assistant treasurer.

Mr. Holzworth has been designated as vice-president in charge of coal mines, coke ovens and blast furnaces, which position he has held during the past year.

Hugh Kennedy, who has been with this company for nearly 22 years, while retiring as operating vice-president, remains upon the board of directors.

Mr. Agnew has been designated as vice-president in charge of iron ore mines, and will move to Buffalo in order to take active charge of that department. He was formerly with this company, and also with the Mahoning Ore & Steel Co. at Hibbing, Minn. He moved to Philadelphia to assume the position left vacant by the death of H. F. Black, ore agent of the Cambria Steel Co.; and was subsequently made assistant to the president of the Midvale Steel & Ordnance Co., which position he held until the merger of that company with the Bethlehem Steel Corporation. He then, with his associates in the raw materials department of Midvale, formed the company of Agnew, Batteiger & Co. of Philadelphia and Pittsburgh, which company, as previously announced, has been appointed sales agent for the surplus ores of Rogers-Brown Iron Co.

The Juhasz Carbureter Corporation, 244 West Forty-ninth Street, New York, has been incorporated with $200,000 capital stock to manufacture carburetors and kindred products. John Juhasz, who heads the company, has been in the carburetor manufacturing business for 15 years and now plans to make installments directly at automobile manufacturing plants and at garages. Expansion of present plant and equipment is being planned.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Bars, Shapes and Plates

	Per Lb.
Bars:	
Refined iron bars, base price	3.54c.
Swedish charcoal iron bars, base	7.00c. to 7.25c.
Soft steel bars, base price	3.54c.
Hoops, base price	5.19c.
Bands, base price	4.39c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	3.64c.
Channels, angles and tees under 3 in. x ¼ in., base	3.54c.
Steel plates, ¼ in. and heavier	3.64c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	4.10c.
Toe-calk, ½ x ⅜ in. and larger	4.60c.
Cold-rolled strip, soft and quarter hard	7.50c. to 8.50c.
Open-hearth, spring steel	4.50c. to 7.50c.
Shafting and Screw Stock:	
Rounds	4.40c.
Squares, flats and hex	4.90c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High-speed steel, 18 per cent tungsten	75c. to 80c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.34c.
No. 12	4.39c.
No. 14	4.44c.
No. 16	4.54c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.55c. to 4.60c.	.....
Nos. 22 and 24	4.70c. to 4.75c.	5.10c.
No. 26	4.75c. to 4.80c.	5.15c.
No. 28*	4.85c. to 4.90c.	5.25c.
No. 30	5.05c. to 5.10c.	.....

Galvanized

	Per Lb.
No. 14	4.95c. to 5.00c.
No. 16	5.10c. to 5.15c.
Nos. 18 and 20	5.25c. to 5.30c.
Nos. 22 and 24	5.40c. to 5.45c.
No. 26	5.55c. to 5.60c.
No. 28*	5.85c. to 5.90c.
No. 30	6.30c. to 6.35c.

*No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
⅛ in. Butt	—41	—24	⅛ in. Butt	— 4	+19
¼ in. Butt	—46	—32	¼ in. Butt	—11	+ 9
1-3 in. Butt	—48	—34	1-1½ in. Butt	—14	+ 6
2½-6 in. Lap	—44	—30	2 in. Lap	— 5	+14
7-8 in. Lap	—41	—11	2½-6 in. Lap	— 9	+ 9
9-12 in. Lap	—34	— 6	7-12 in. Lap	— 3	+16

Bolts and Screws

Machine bolts, cut thread, 45 and 10 to 50 and 10 per cent off list

Carriage bolts, cut thread, 35 to 35 and 10 per cent off list

Coach screws ..... 45 to 50 and 10 per cent off list

Wood screws, flat head iron, 75, 20, 10 and 7½ per cent off list

Steel Wire

BASE PRICE* ON No. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.50c. to 4.75c.
Annealed soft	4.50c. to 4.75c.
Galvanized annealed	5.15c. to 5.40c.
Coppered basic	5.15c. to 5.40c.
Tinned soft Bessemer	6.15c. to 6.40c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	18¼c. to 19¼c.
High brass wire	18¾c. to 19¾c.
Brass rods	16 c. to 17 c.
Brass tube, brazed	26¼c. to 27¼c.
Brass tube, seamless	22½c. to 23½c.
Copper tube, seamless	23¾c. to 24¾c.

Copper Sheets

Sheet copper, hot rolled, 21¾c. to 22¼c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin			Coke—14 x 20		
	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Prime	Seconds
			80 lb.	$6.55	$6.30
			90 lb.	6.65	6.40
			100 lb.	6.75	6.50
IC	$11.75	$9.50	IC	7.00	6.75
IX	13.25	11.50	IX	8.25	8.00
IXX	14.50	12.50	IXX	9.50	9.25
IXXX	15.50	13.75	IXXX	10.75	10.50
IXXXX	16.50	14.75	IXXXX	12.00	10.75

Terne Plates

8 lb. coating, 14 x 20

100 lb.	$7.00 to $8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire door stock	9.00 to 10.00

Tin

Straits pig	62c.
Bar	68c. to 70c.

Copper

Lake ingot	15½c.
Electrolytic	15 c.
Casting	14 c.

Spelter and Sheet Zinc

Western spelter	8c.
Sheet zinc, No. 9 base, casks	10¾c. open 11½c.

Lead and Solder*

American pig lead	11c. to 12c.
Bar lead	14c. to 15c.
Solder ½ and ½ guaranteed	40c.
No. 1 solder	38c.
Refined solder	34c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	75c. to 90c.
Commercial grade, per lb	35c. to 50c.
Grade D, per lb	25c. to 35c.

Antimony

Asiatic	13c. to 14c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb	36c.

Old Metals

Demand is erratic and values uncertain because of the change in the new metal market. Dealers' buying prices are as follows:

	Cents Per Lb
Copper, heavy crucible	12.00
Copper, heavy wire	11.25
Copper, light bottoms	9.50
Brass, heavy	6.75
Brass, light	5.50
Heavy machine composition	9.25
No. 1 yellow brass turnings	7.25
No. 1 red brass or composition turnings	8.75
Lead, heavy	8.00
Lead, tea	6.25
Zinc	4.25
Cast aluminum	17.00
Sheet aluminum	17.00